DEPARTMENT OF TECHNOLOGY
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NOVEMBER 30, 1957
VOL. 153 — NO. 22

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

TELEPHONE "STORE"

Michigan Bell Telephone Co.'s newest idea for merchandising service is this "Telephone Showroom." Attendants show latest equipment and offer advice on use of color telephones in home planning. Story on page 52.

Published every week on Saturday by TELEPHONY PUBLISHING CORP. 608 S. Dearborn St., Chicago 5, Ill. Subscription $4.00 per year. Entered as second class matter at the Post Office at Chicago, Ill., under the act of Mar. 3, 1879.

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ELECTRONICS SECTION — Page 23

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

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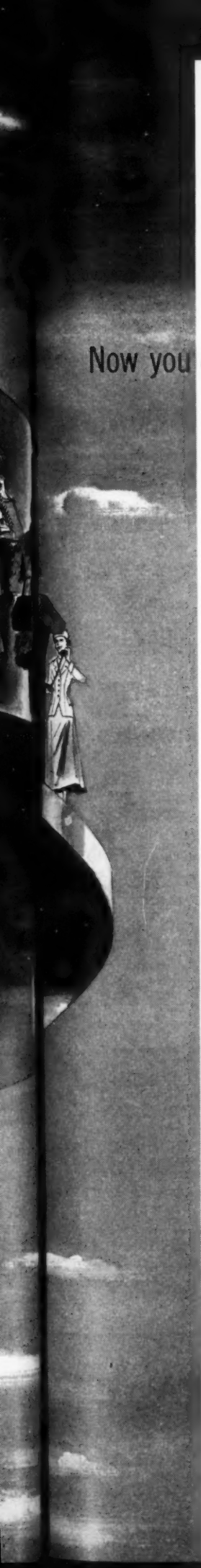

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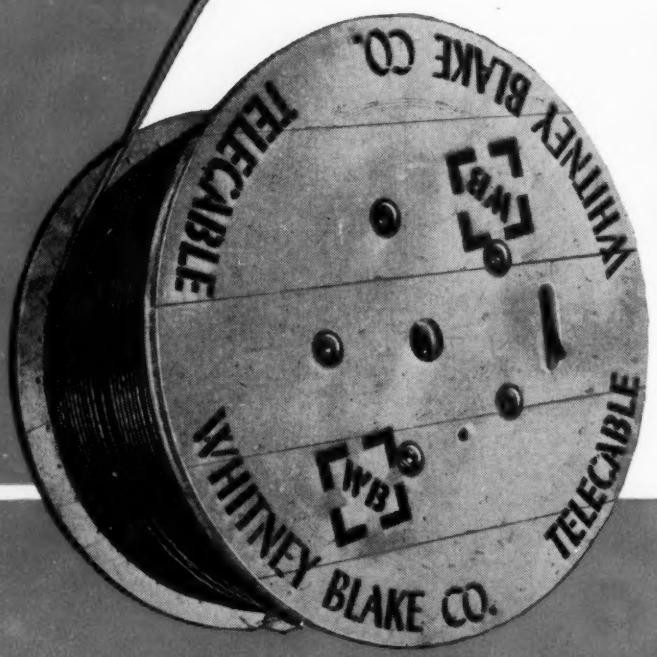

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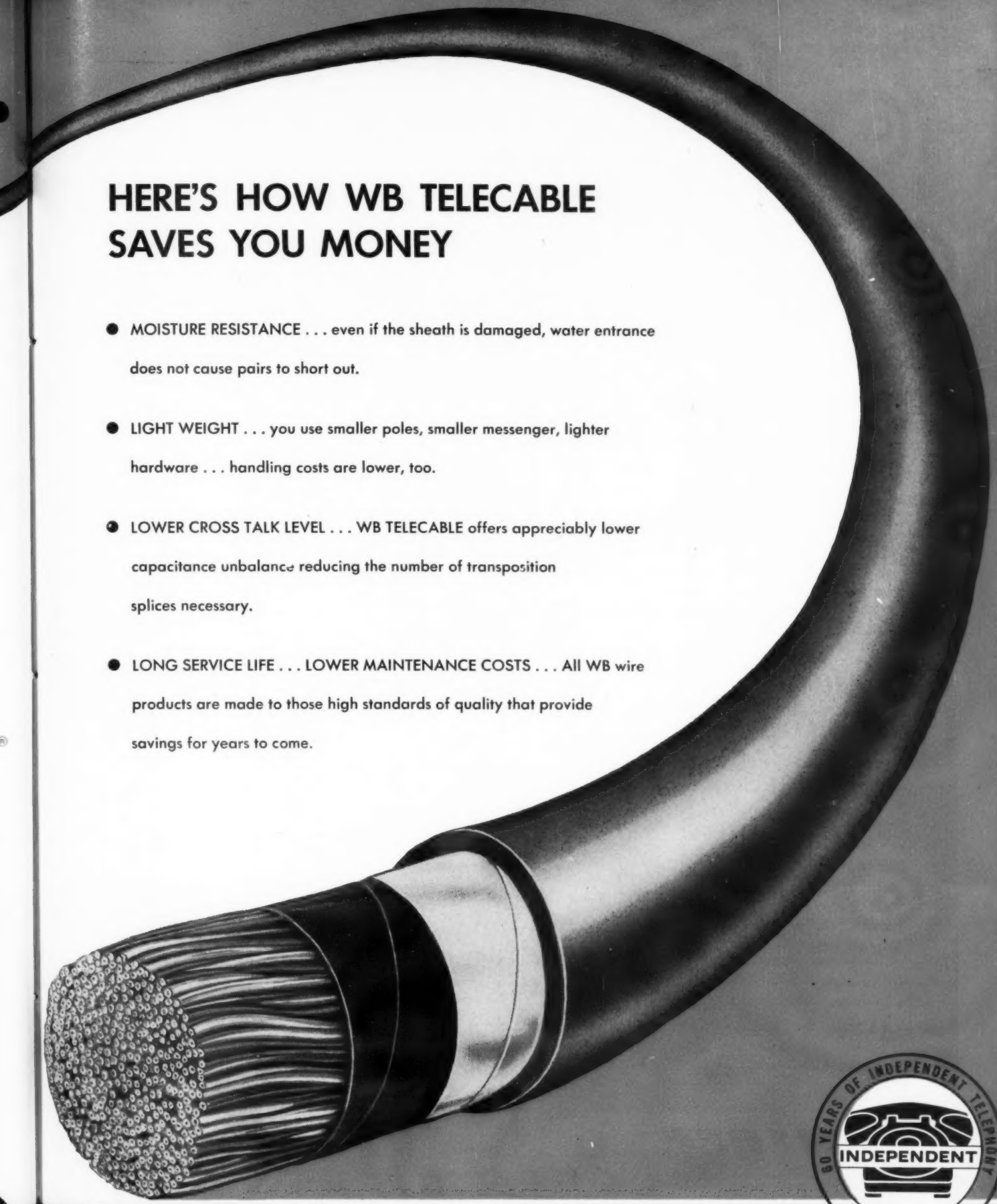

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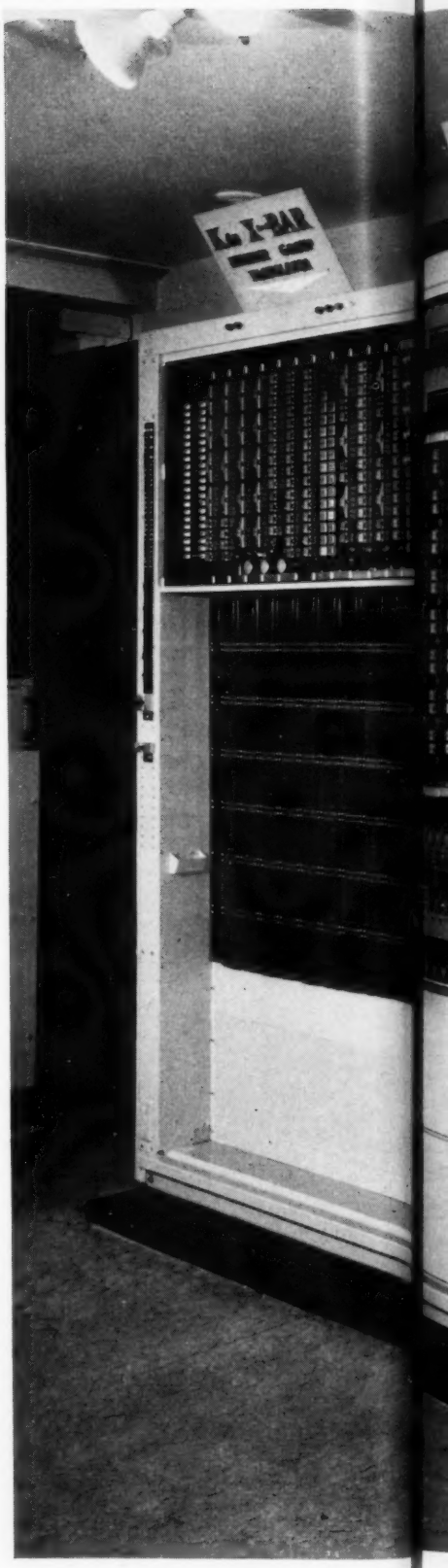

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- **PBX groups may be spread over entire office—eliminating need for high traffic connector group.**
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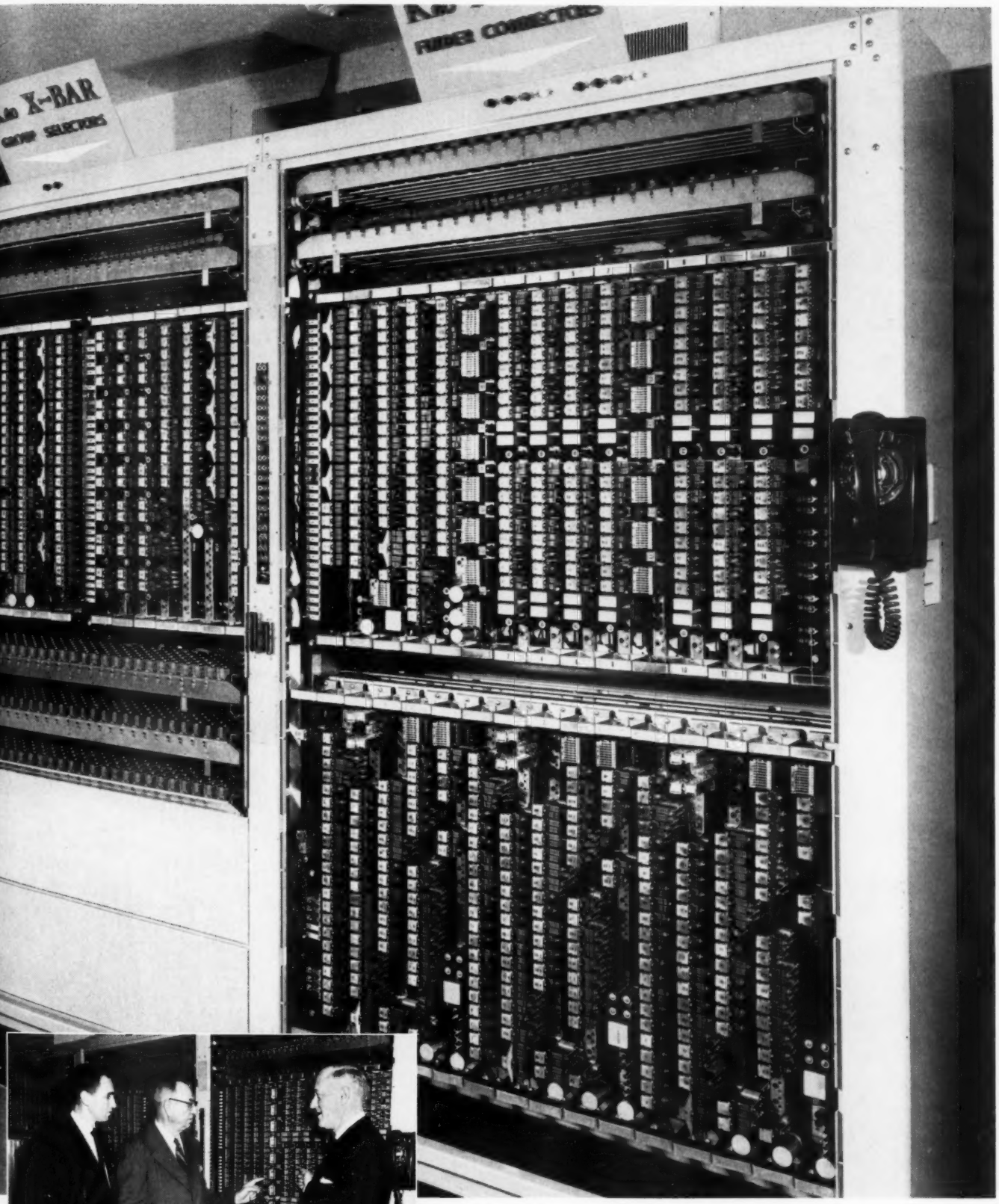

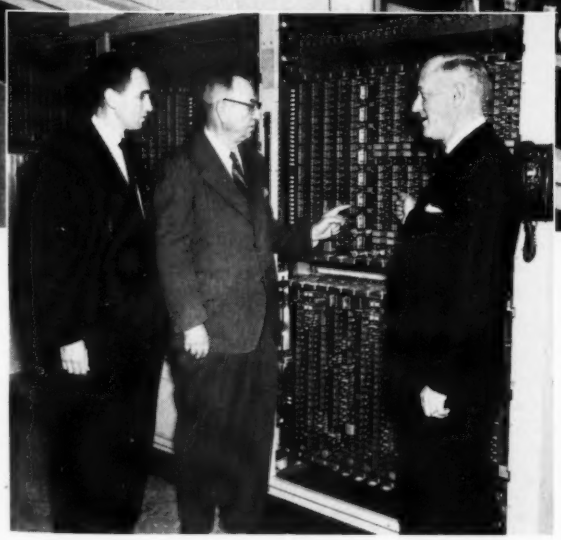

The K-60 Crossbar Switching System was introduced in this display at the U.S.I.T.A. Convention. This new unit reduces floor space requirements of previous crossbar equipment by 30%.

Among many distinguished visitors expressing interest in the new K-60 was Mr. S. A. "Gus" Lane, President of the Western Arkansas Telephone Company, Russellville, Arkansas. Mr. Lane (center) was shown the systems' many outstanding features by G. T. Scharffenberger (left), President, and W. P. Hollis, Vice President, of Kellogg Switchboard and Supply Company.

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FLASHES AND PLUGS

ATOMIC AGE. "Grandpa, why don't you get a hearing aid?" "Don't need it, son. I hear more now than I can understand.

•

TIME TO COOL OFF. We understand from *Long Lines*, monthly employe publication of American Telephone & Telegraph Co.'s Long Lines Department, that "in Iceland, the telephone books are slightly different from our own. Subscribers are all listed by their first names and the family name comes second. And to confuse it a little more the family name is usually the father's name plus the Icelandic word for son or daughter.

"For instance a daughter, Joan, of a man named James, would be listed as Joan Jamesdaughter.

"We can imagine some of our GI's when they were stationed in Iceland thumbing through the book and muttering 'What did she say her old man's name was?' "

•

PA, PDQ! One of the outside telephone representatives for California Water & Telephone Co. in Monrovia, Cal., recently called a local industrial shop where some of the telephone men were to install new communications equipment.

"This is Art Sherman from California Water & Telephone Co. Our installers there yet?"

There was a slight pause. Then over the public address system came the announcement, loud and clear: "Mr. Stallers, Mr. R. N. Stallers, you are wanted on the telephone please."

•

BACK FROM LIMBO. A Chicago telephone operator took an incoming long-distance call for Adlai E. Stevenson.

"How do you spell the name?" she asked. On the other end, a Washington telephone operator said: "You know, the Presidential candidate."

"Don't remember him," said the girl in Chicago. "Spell the name slowly please."

•

PECULIAR INDEED. A telephone call to the police in Hobbs, N. M., sent them on a tour of investigation recently when a frantic woman called to complain about "a very peculiar noise."

The noise turned out to be a cageful of circus lions roaring for their dinner.

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Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1904

November 30, 1957

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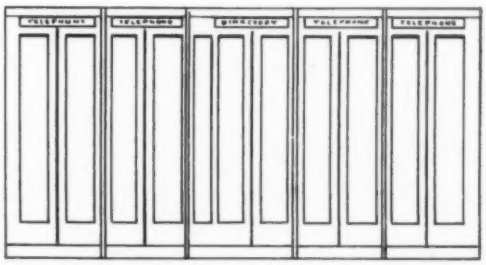

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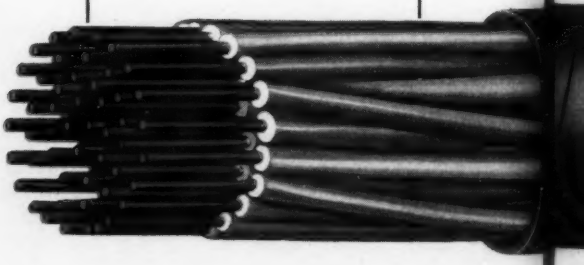

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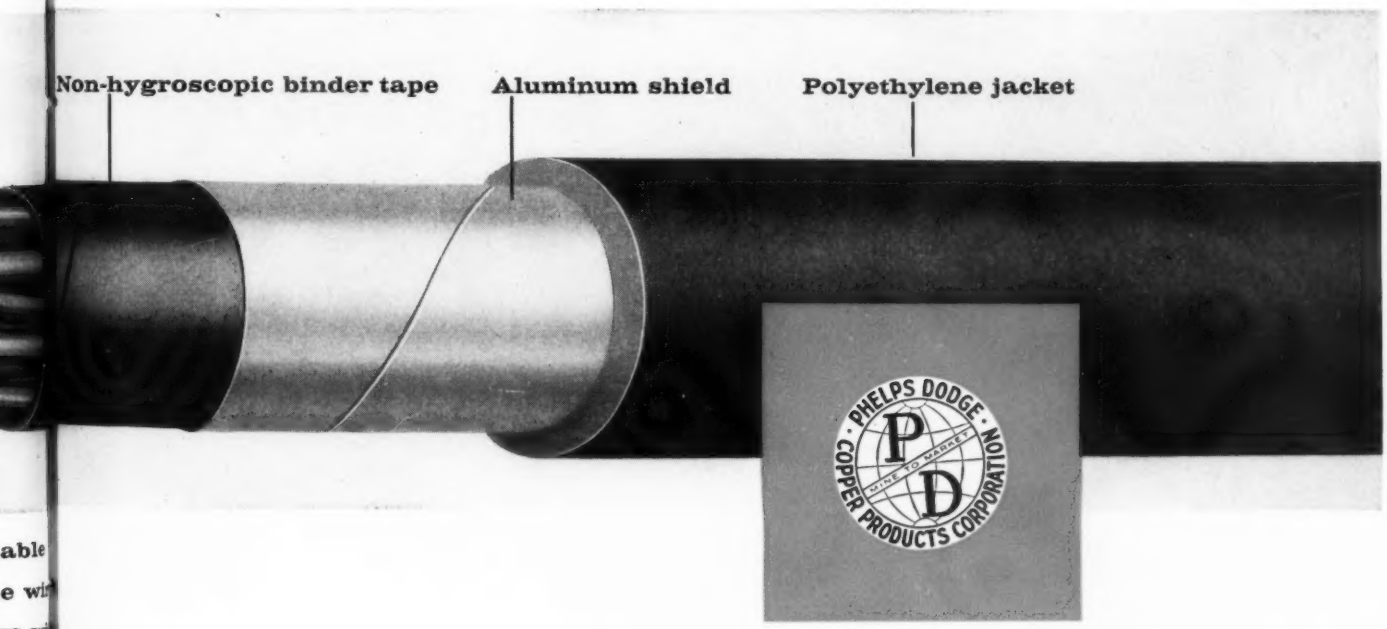

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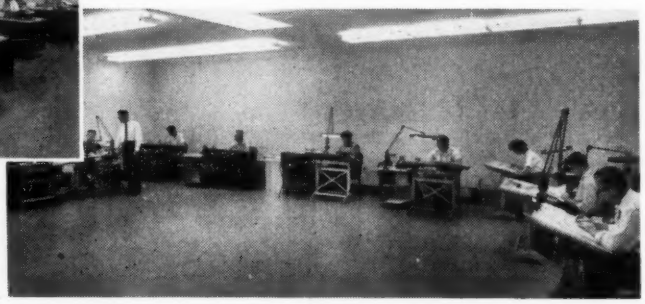

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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

The NARUC convention . . . Notes small degree of softening in attitude of some state commissioners on use of past cost factors as basis of fixing future utility rates . . . Commissioners call for repeal of telephone excise taxes. NARUC president says that regulation does not call for hatred of utilities.

BECAUSE of other and more perishable items which have had to be covered in this department, your correspondent is a little tardy getting around to the annual convention of the state regulatory commissioners (National Association of Railroad and Utility Commissioners—NARUC) at Memphis on Oct. 28 to 31. This is not because the Memphis meeting was any less important than previous annual gatherings of the national association of the regulatory bodies. True the telephone industry, as such, was given comparatively less attention than in former years, due to emphasis on other pressing matters—such as atomic power development and the treatment of accelerated depreciation for taxes on gas and electric companies.

Yet, these annual meetings of the state commissioners always produce some noteworthy developments for the attention of people in all public utility industries. Going through the various committee reports and speeches, this correspondent thought he detected a small degree of softening in the hitherto adamant attitude of some state commissioners on the use of past cost factors, such as cost of capital, as a basis for fixing future rates. That is probably the most significant item to be noticed in a rather large potpourri of materials, much of which dealt with motor carriers, railroad transport, safety and procedure, and other subjects of relatively less concern for telephone people.

It is a rather interesting fact (at least this writer thinks it is a fact) that state commission staff people are sometimes more persistent and rigid in their attitude on rate-making than many of the commission members themselves. It is probably impolite to point. So, let us leave that with the general comment that staffs often have stricter views than their commissioners. This is not an original observation by this observer, though it is a distinction that is not usually openly discussed. But, any experienced rate case lawyer who has tried matters before a number of these commissions would readily bear out the foregoing suggestion.

Just where, the reader may wonder, was there any evidence that the commissioners were thinking any less sternly, than heretofore, on the subject of confining utility rates to a strict return on past or original cost value? Well, here is a very thoughtful passage from the report of the NARUC Committee on Rates of Public Utilities. This is headed by Paul E. Weiland, director of public utilities of the Ohio Public Utilities Commission. The report states:

"We find that new inflation is causing, and will continue to cause, a new series of rate increases. At the end of 1956, application for electric rate increases amounted to 35.1 million dollars, over three times the amount pending at the end of 1955.

"Applications for retail gas rate increases of 42.2 million dollars were pending at the end of 1956 which was 17 million dollars more than were pending at the end of 1955. At the end of 1956, approximately 136.7 million dollars of telephone rate increases were pending. . . .

"Renewed inflation and the increased cost of money revive the necessity of adopting a forward-looking view in the fixing of utility rates. . . . Regulatory methods have of necessity been 'backward looking' rather than anticipatory or forward looking in technique.

"This is easily understandable, since the necessity for firm justification of the rates requires firm basic data.

"However, your committee feels that in view of the above recent economic changes, 'backward looking' methods must, to the extent possible, be co-ordinated with principles founded upon anticipatory views."

Another interesting point made in the report of Mr. Weiland's committee was recognition of the "attrition" factor—meaning the loss of real earnings due to the steady rise of inflationary pressure and the resulting erosion of net revenues over a period of time. The report states on this:

"As previously brought out, the renewed impact of inflation on operating costs, coupled with the increased cost of new capital, will most certainly exert a double pressure for upward revision of utility rates. This is especially true in the case of a utility that is faced with the problem of major plant expansion to meet increasing service demands.

"Lacking any offset, earnings adequate today under today's level of utility rates will inevitably become inadequate tomorrow. Moreover, this appears to be a continuing problem throughout the coming years.

"There are, however, a number of factors which hold forth some promise of at least mitigating this upward pressure on utility rate levels over the long pull. Success in this respect hinges on the manner in which utility operations are conducted.

"Fundamentally, it is a question as to whether a utility management functions with the long-term view in mind, or must tailor the pattern to accomplish short-term results.

"For example, if utility plant is constructed on a wholesale and stabilized basis, with the ultimate usage as the determining factor, utility service can be produced over the life of such plant at a cost lower than would be required if the plant were constructed on a piecemeal, start-stop basis.

"However, such a program, which

has favorable long-range cost implications for the utility customer, involves the utility itself in higher initial capital commitment, together with its depressing effect on current earnings, and the assumption of a longer-term risk.

"In the utility operating field there are similar possibilities. Expanded research and long-range employe training may well produce increased efficiencies in the future years, even though expenditure for such purposes today results only in reducing current earnings."

The report goes on to state that if utilities are given some margin in earnings management they can adopt such long-range programs with some degree of safety. However, if they are kept on an inadequate or hand-to-mouth basis with respect to earnings, management may be forced to adopt short-range expedients which may prove wasteful or unwise over the long pull.

High Cost of Money

Another thoughtful report was that of the NARUC Committee on Corporate Finance headed by Francis T. Mylott, a member of the New York Public Service Commission. This report reviewed the rapid increase in the cost of money needed for investment in utility plant since 1930. It also pointed to the rapid increase in the demand for new capital by all kinds of utilities which reached a record high of 35.1 billion dollars in 1956.

This committee report then fired a shot at an idea of the strict regulationists, which was very popular a few years ago, that cost of capital as evidenced on the money markets should be the controlling, if not the sole, measure of a fair rate of return. It has been pointed out in this department a number of times that such a regulatory policy would be tantamount to a commission abdicating its regulatory authority in favor of the judgment of the market place, a judgment exercised for an entirely different purpose. Anyhow, here is what the corporate finance committee report stated on this point:

"The rapid rises in the cost of debt and of preferred stock capital have brought in sharper focus the inadequacy of earnings-price and dividend-price ratios as a measure of the cost of common stock equity. In many instances such ratios are lower than the yield on high-grade bonds.

"Certainly, it is unreasonable to believe that junior equity capital, bearing the risks of business, is cheaper than the capital represented by senior obligations. This matter was considered at some length at the San Francisco convention during a panel discussion on the cost of capital as related to the rate of return.

"At that time, it was pointed out that low earnings-price and dividend-price ratios are meaningless as a measure of investor expectations. It was also brought out during the same discussion that one commission had practically rejected the earnings-price ratios and instead had considered such factors as general interest conditions, earnings enjoyed by other companies somewhat comparable to the one under review, attraction of capital, and the return earned on the common stock equity.

"While the increase in the cost of debt and preferred stock equity money in the past is comparatively easy to measure and has been considered by many commissions in arriving at a fair rate of return, the difficulties of measuring the cost of common stock equity raises the question as to whether or not the use of this method as a measure in determining fair rate of return should be reconsidered.

"It has been suggested that it might be more desirable to place less reliance on the so-called 'cost of money' for common stock equity and more on such factors as earnings of unregulated industries with comparable risks and the expansion needs of the utility in determining a fair rate of return."

REA Approves $629,000 in Rural Telephone Loans

The Rural Electrification Administration approved a total of $629,000 in telephone loans to two borrowers in Indiana and Kansas last week, the U. S. Department of Agriculture announced on Nov. 19. The loans will finance initial telephone service for 339 rural subscribers, improve the service extended to 664 others, and other system improvements. Details follow:

Washington County Rural Telephone Cooperative, Pekin, Ind.; $53,000, second loan (Nov. 14). To provide initial service to 43 farm families and improved service to 64 existing subscribers in the vicinity of Martinsburg. The cooperative has recently acquired the Martinsburg exchange, which furnishes magneto service, from the Indiana Telephone Corp. Subscribers in the new area will be served from the borrower's adjacent Pekin exchange.

The present and a prior REA loan to this borrower, totaling $363,000, will finance new and improved service to 844 rural subscribers. The completed system will consist of exchanges at Borden, Chestnut Hill and Pekin, which are all in operation, serving approximately 550 subscribers.

William O. Martin is president of the Washington County Rural Telephone Cooperative, and J. B. Miller is manager.

•

Northern Kansas Telephone Co., Effingham, Kans.; $576,000, fourth loan (Nov. 14).

The loan will finance initial service for 296 rural families and improved service for 600 existing subscribers. In order to accomplish this, the borrower plans to expand its service area to serve subscribers now receiving magneto service from the Carter Telephone Co. at Lenexa, Kan., whose facilities the borrower proposes to acquire and integrate into its system. The Carter company, also an REA borrower, has requested that its loan, approved in July 1956, be rescinded coincident with approval of this loan to the Northern Kansas Telephone Co. The Carter company now provides magneto service through exchanges at Centerville, Greeley, Lane and Parker.

New construction will include automatic central offices at Greeley, Lane and Parker. The Centerville exchange will be eliminated. A portion of the loan will be used to complete the borrower's present system.

The present and three prior REA loans to the borrower, totaling $2,181,000, will finance new and improved service to 4,964 rural subscribers.

The system is located in three non-contiguous areas. It will consist of 19 exchanges when complete.

Herbert H. Welsh is president and manager of the Northern Kansas Telephone Co.

NARUC Telephone Developments

There were really only two items reported or discussed at the Memphis meeting of the NARUC of direct interest to telephone companies, as such. One was the action taken by the convention in unanimously adopting a resolution calling on Congress to repeal the telephone-telegraph excise tax (TELEPHONY, Nov. 23, p. 19). This has already been commented upon in this department. Similar resolutions have been adopted by the NARUC in the past.

But, it is worthy of special note that the NARUC resolution adopted at Memphis did not throw the telephone excise tax repeal in with similar demands for repeal of passenger transport excise taxes (on plane, train, bus travel, etc.). This year, the resolution was specifically directed to an appeal for the end of excise taxes on telephone and telegraph service.

Furthermore, instead of simply directing the association (through its general solicitor) to represent the association with respect to such repeal legislation (as in previous years), the Memphis resolution authorized the president of the NARUC to appoint a special committee of state commissioners to go to work on this subject of repealing the telephone and telegraph excise taxes.

Another NARUC report which is usually of direct concern to the telephone industry, turned out to be more or less in the nature of a progress report at the Memphis meeting. This was the report on the separations manual by a special telephone committee cooperating with the Federal Communications Commission.

It might be noted, however, that this special committee, headed by Matt L. McWhorter of the Georgia commission, paid a compliment to the United States Independent Telephone Association for its assistance in studying the separations manual, which is still in the process of review. The report said:

"The principal accomplishment of your committee during the past year has been the rewriting of the separations manual. Following the directive of the 1956 convention, the staff committee has drafted a revised manual which incorporates all the changes since its last revision, and embodies such other changes required to reflect the latest operating conditions and regulatory requirements. . . .

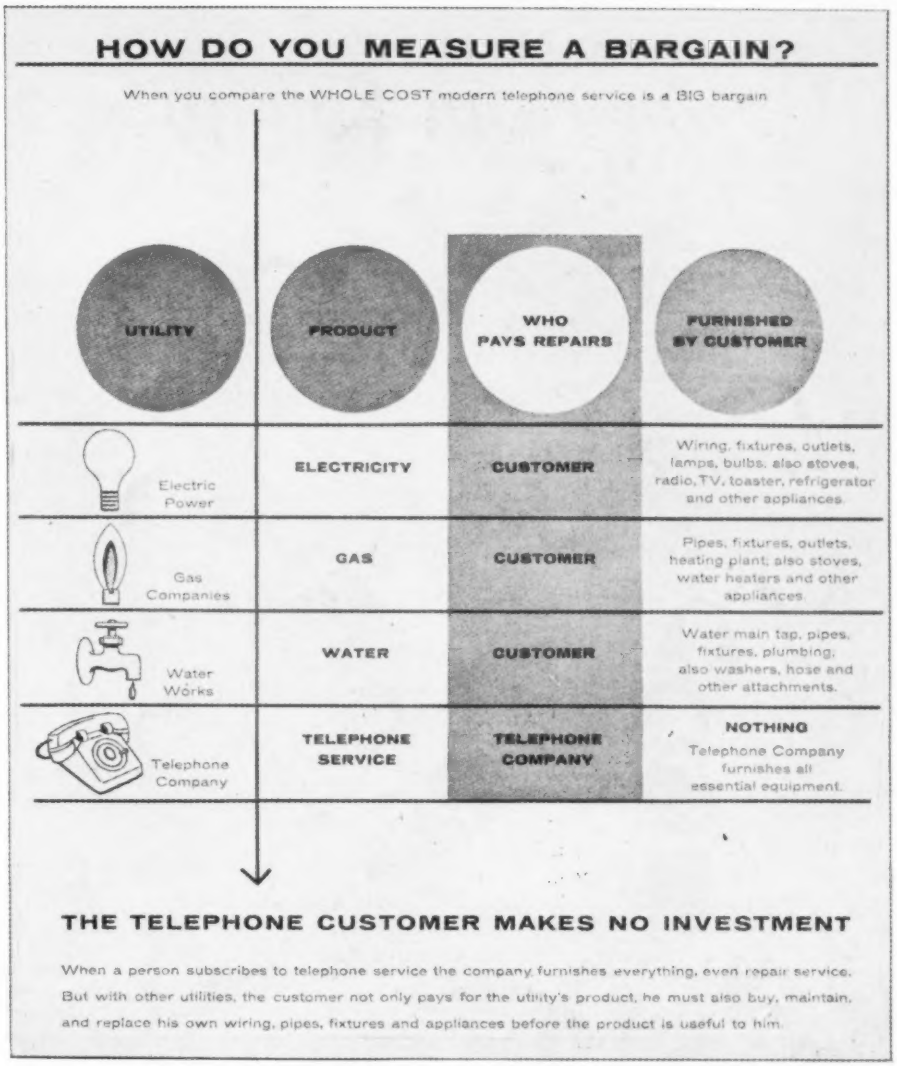
"Representatives of the United States Independent Telephone Association and the Bell System took an active part in the meetings and technical discussions of the task force. While these industry representatives had no vote in the decisions regarding the actual content of the manual, they did render invaluable assistance in making the detailed studies necessarily required by an understanding of this nature.

"The result of this close cooperation between industry and regulatory personnel is that your manual now contains specific procedures which can be applied to both the Independent industry and the Bell System. . . .

"As pointed out in the staff committee report, there still exist certain areas which require further study and consideration. One such area is the application of the actual use principle of separations in instances where substantial seasonal factors are present.

"Your committee recommends that the needed additional studies be undertaken and further consideration be given to clarifying the manual in this respect.

"As recommended by the staff committee, your committee believes it is also desirable to study the feasibility and desirability of including in the manual methods of developing allocation factors and to consider other basic separations procedures."


HOW DO YOU MEASURE A BARGAIN?
When you compare the WHOLE COST modern telephone service is a BIG bargain
UTILITY
PRODUCT
WHO PAYS REPAIRS
FURNISHED BY CUSTOMER
Electric Power
ELECTRICITY
CUSTOMER
Wiring, fixtures, outlets, lamps, bulbs, also stoves, radio, TV, toaster, refrigerator and other appliances.
Gas Companies
GAS
CUSTOMER
Pipes, fixtures, outlets, heating plant; also stoves, water heaters and other appliances.
Water Works
WATER
CUSTOMER
Water main tap, pipes, fixtures, plumbing; also washers, hose and other attachments.
Telephone Company
TELEPHONE SERVICE
TELEPHONE COMPANY
NOTHING
Telephone Company furnishes all essential equipment.
THE TELEPHONE CUSTOMER MAKES NO INVESTMENT
When a person subscribes to telephone service the company furnishes everything, even repair service. But with other utilities, the customer not only pays for the utility's product, he must also buy, maintain, and replace his own wiring, pipes, fixtures and appliances before the product is useful to him.

—Reprinted from *Crosstalk*, employe magazine of West Coast Telephone Co., Everett, Wash.

President Hammond's Remarks

No report on the Memphis meeting would be complete without reference to the very gracious and somewhat sentimental address of the retiring president of the NARUC, John C. Hammond of the Tennessee commission. He is one of the grand old men of regulation, and a beloved figure on the regulatory scene. He made one comment about the unfairness of those who seek to stir up hate against public utilities which is well worth passing on. He said:

"I am sure we do not have any of them any more but no doubt you have heard of commissioners who professed great affection for the dear people while at the same time professing deep resentment and hate for the utilities which they regulate.

"I am sure it is quite clear to all of us gathered here that the utilities which we regulate are part of the public. They have assumed the rôle of citizenship, are heavy taxpayers, and are entitled to fair and just treatment.

"It is not always an easy matter to determine just when a fair rate of return ends and confiscation begins. Certainly, we do not wish to be understood as advocating that the utilities are always entitled to anything they request at the hands of the commission.

"I have said many times, both personally and officially and from the bench, that when properly understood and evaluated the interests of the utilities and the general public are not in serious conflict."

The incoming president of the NARUC, elected at the national convention, will be Edward R. Thornton of the New Hampshire commission.

The American Enterprise System

Address given before school superintendents, principals and teachers taking course in Education for Economic Competence which is administered by the Bureau of Business Education in cooperation with the Chicago Teachers College, a unit of the Chicago Board of Education.

By EDGAR PESKE*

YOU PEOPLE in the Chicago school system under the leadership of Enos Perry, are doing a job in economic education through these courses which are becoming famous throughout the country. As a representative of Illinois Bell and a product of the Chicago public schools, I am doubly honored to be asked to appear as the first speaker in your current course.

I would like to start out by congratulating all of you on the foresight and good judgment you have displayed by picking these United States as a place to live and to raise your families. I extend these congratulations, not in a spirit of chauvinistic, emotional nationalism but on the solid and reasonable grounds that our living standards are higher than those of any other country on the face of the globe. And under our economic system, these living standards are still rising rapidly; the gap between our economic performance and that of other advanced nations is widening, not narrowing.

In describing our economic pre-eminence, Adlai Stevenson has said that we are a nation of the most powerful consumers on earth. Theodore Houser of Sears, in like vein, says that under our economic system America has almost eliminated poverty in the Biblical or historical sense of the term. The poor among us, he goes on, are sociological rather than economic casualties—the victims of broken homes, intolerance and intemperance. And the great contemporary historian Arnold Toynbee, adds: "The 20th Century will be remembered not for its wars nor its conquests of distance and disease, not even for the splitting of the atom, but for 'having been the first age since the dawn of civilization . . . in which people dared to think it practicable to make the benefits of civilization available for the whole human race.'"

How High a Living Standard?

How good are our living standards? How much better off are we than people elsewhere?

A year or two ago, the Swiss economist, W. E. Rappard, became absorbed in the question of whether America is really better off than the rest of the world, and if so, why. He wrote an entire book on this subject. Among other things, he found that the average income per person in the United States is two, three or four times higher than that of the average Englishman, Frenchman or Swiss.

EDGAR PESKE

He learned that the United States excels in the production of a long list of economic goods, also that it leads all other nations in the consumption of electric power, in automobiles and telephones per 100 population and in gold holdings. America not only manufactures and sells its goods to other nations but, through loans and grants of one kind or another, pays for some portion of them too.

For further proof, let me cite a few facts from the 20th Century Fund's study of "America's Needs and Resources." In this country we have a little more than 6 per cent of the world's population and 7 per cent of its land area. But we produce and consume well over one-third of the world's goods and services, we turn out close to one-half of the total factory goods produced and we have 40 per cent of the world's income.

According to the Fund, the typical American enjoys a standard of living several times higher than the average for the 2½ billion people in the world —many times that of the hundreds of millions of people who keep the average as low as it is. (Incidentally, you may be interested in a recent "pocket" reprint of the 20th Century Fund's study, called "U.S.A. in New Dimensions.")

There is hardly any need to belabor this point with further statistics. If you are still skeptical as to the superiority of American living standards, look around this very room for all the proofs you need.

Look at the bright, attractive suits and dresses, count the wristwatches, notice the well-groomed hair, the well cared-for teeth. Tally up the number

*Mr. Peske is assistant vice president, Illinois Bell Telephone Co.

of you who drove automobiles to this meeting.

List the mechanical-electrical appliances in your home—for that matter the cigarette lighters, fountain pens, mechanical pencils and other gadgets in your pockets, to say nothing of the multitude of other items overflowing those valises women call pocketbooks.

Look at all this, then answer for yourselves the question whether any similar assemblage of Britons, French, Russian or Chinese would appear as modish, have the same advantages and live as well as you do and I do.

Why Such a High Standard?

What accounts for our unparalleled living standards? Why are we so much better off than any other nation in the world?

At first blush, we are apt to jump to the conclusion that we possess much more of the world's resources, much more of its natural wealth. The fact of the matter is we are rapidly becoming a "have-not" nation.

This was demonstrated most dramatically during World War II when we suddenly found ourselves without natural rubber, short of oil, lacking copper, tin, lead, saw-mill products, newsprint and wool as well as coffee, cane sugar, and other consumer goods.

What is more, our shortages have grown rather than diminished since that time. Today we must import large quantities of many of the natural key resources we need for manufacturing and use in production. In 1954, for example, we imported 95 per cent of our nickel, 85 per cent of our tin, 37 per cent of our lead, 32 per cent of our copper and—with the rapidly nearing exhaustion of the Mesabi range—even 14 per cent of our iron ore.

No, we can hardly ascribe our high and rising prosperity to America's unusual wealth in natural resources. We'll have to look elsewhere for the answer.

One mighty important factor, certainly, is the heritage of adventure, resourcefulness, creative work and the sense of equality which descends to us from the emigrants who left their old homes in Europe to take up new lives here—from the generations of pioneers who pushed further and further westward to the eventual settlement of our entire country.

As history goes, these times are not far behind us. And though many of us are Johnny-Come-Latelies, the spirit of these days remains indelibly stamped on the entire country.

Careers Are Unlimited

Another major factor is that, because of our democratic traditions, most of us entering on our life careers feel our possibilities are limitless. We believe the world is our "oyster" and we are not far wrong.

There is no question but that inherited wealth, social position and family prestige make for inequality here as elsewhere. But in America anyone, regardless of background, can rise far if he possesses intelligence, skill, ambition, drive and—as in all human affairs—the necessary bit of luck besides.

As George Santayana, the philosopher, put it: "In America there is but one way of being saved . . . through the gospel of work and belief in progress."

Of course, our political system has also contributed substantially to our economic successes. Under the Constitution and the Bill of Rights, we as individuals are politically free to work and live where we please; politically free to determine the course of our own lives and to settle our own fates; free from the governmental intervention in our daily affairs which marks off the autocracies and the dictatorships from our own democratic system.

We expect generally that in this country there will be no prescriptions by government or government agencies of the kinds and quantities of goods to be produced, who shall produce them, where and at what prices they shall be sold, who is to work in what jobs, and what wages they shall be paid.

In short, our economic system is free and private. We allow, in fact we expect, individuals to take their own heads in producing and marketing the whole galaxy of things we need just to live, to say nothing of all the additional items we Americans want in order to live better. Broadly, we expect this to be done without governmental subsidy for interference.

We expect, too, that the factories, the transport equipment, the retail stores and the utility services required to produce most of the things we want will be financed from the private savings of individuals and institutions—in other words, that most of these facilities will be privately owned.

Automatic Limits

Now the fact that we do not control business or individuals by governmental action does not mean that every one of us is free to do as we please without limitations of any kind. Far from it.

Instead of governmental controls, we look to the automatic controls of the free market place first visualized by Adam Smith. Under these, the prices of most goods are set competitively, one producer or distributor checks the other and the consumer decides by his purchases what shall be produced and how much.

This system that we have developed and that has worked so well for us has a number of descriptive labels. The oldest, perhaps, is the name "Capitalism"—an economic system, according the dictionary, "in which the ownership of land and natural wealth, the production, distribution and exchange of goods, and the operation of the system itself, are effected by private enterprise and control under competitive conditions."

Widespread Ownership

Some people have called our system "Peoples' Capitalism" because under it the production and distribution of economic goods are carried on by corporations owned directly or indirectly by millions of our people.

For example, my own organization, the Bell System, has over 1.5 million share owners. These owners are largely individuals but they also include insurance companies and pension funds which have, in effect, invested your savings in corporate securities.

Still other people have called our system the "Private" or "Free Enterprise System." By "enterprise," they mean it depends on independent, courageous and resourceful risk-taking by individuals. "Private" refers to private ownership and operation of the facilities required for production and distribution. "Free" describes our political philosophy of freedom from governmental control.

So far, we have been describing our system and talking about how it operates. An even more important question is what makes it operate, especially what makes it operate as well as it does?

The answer is fairly obvious if we think about it. The worker puts in his days at the factory, office or on the construction job in order to earn wages, with which he can buy the things he and other people produce, and put them to use for the benefit of himself and his family.

The business owner or manager risks his time and money producing and selling things at prices which he hopes will yield a profit.

The investor puts his money into those ventures which, consistent with the safety of his principal, promise to yield the highest return.

Fundamentally, then, we all try by the investment of our time, work and money to gain as much of the world's goods for ourselves as possible.

Is the System Selfish?

On the surface, this may sound like a completely selfish society—a law of the jungle situation in which every one of us is striving solely for his own particular advantage without regard for the next fellow. Perhaps they were unduly influenced by Darwin's theory of the survival of the fittest, but that is exactly the way the classical economists pictured the situation.

But they excused it all on the basis that, while the individual acts selfishly, the system as a whole translates selfish motives into our common advantage. Through its internal, built-in controls, the competitive system in our free market uses selfish motives as the fuel to run the engine—and the engine, as it drives along, carries with it the entire American society.

Any fuel-driven engine needs a spark to set it off and to keep it running. This spark is supplied by the profit motive: the hope of every producer and distributor that his business operations will achieve profits and his simultaneous fear that they may instead incur losses.

Why attribute the key function in our economy to the profit motive? Because business performs what economists call the "entrepreneurial" job —that is the job of combining labor with land and capital to produce the goods and services our country needs and we want.

Our high economic standards result from the cost reductions made possible by mass production and mass distribution; mass production and distribution require large-scale business organization; large-scale and all other business organization is undertaken only with the profit possibilities in view.

As Clarence Randall put it: There are two incentives to production under our system—the hope of gain and the fear of loss. Remove either, and our economy will go dead.

Importance of Investor

The hope of profit plays another and equally important role. It induces people who have saved their money to invest it in business plant and equipment. Few of us realize the amount of equipment American business provides to support the productive abilities of its workers. Few realize its importance to us and the entire economy.

Accurate figures are difficult to obtain but it is probable that the plant and equipment investment per worker of all American non-financial companies averages over $7,000. My own industry is much higher—about $19,000 per worker.

Business capital expenditures for these purposes ran about 36½ billion dollars in 1956 and are expected to go even higher this year. These expenditures are important because additions to the stock of business plant and equipment are the primary means of increasing our production of goods and services per day or per hour of human labor. And the more we produce, as a nation, the more we have to consume.

Rising Productivity

Over the years, in America, we have taken tremendous strides towards increasing human productivity. Just one illustration: According to the 20th Century Fund, the 1850 worker, putting in 70 hours weekly, turned out 34 cents worth of goods hourly in terms of 1950 prices. By 1900, this was up to 75 cents worth of goods and services per hour and by 1950 it had risen to $1.94. And Gilbert Burck in a *Fortune Magazine* article has estimated that, over the years when living standards have risen so markedly, Americans have taken only about half of their potential income increases as leisure in the form of a shorter work day and a shorter work week.

One characteristic almost unique to the U. S. should be stressed. Our great gains from increased productivity have been distributed throughout our society. Most everyone has gained, not just a favored few in the top income brackets.

Fortune's story on "The Changing American Market," supplies supporting evidence, all based on income after personal taxes adjusted to the value of the dollar in 1953. Here are some of the facts it develops: Between 1941-1953 the income of the bottom one-fifth of the population increased 38 per cent, that of the top one-fifth only 11 per cent.

Between 1929-1953 the great middle income group of the country (defined as those with income ranging between $4,000-$7,500 annually) grew from 5½ per cent to 18 per cent of all the families. And their share of the total consumers' income increased from 25 per cent to 42 per cent.

Benefits of Mass Production

Five years ago Frederick Lewis Allen wrote an excellent historical account of our times, titled "The Big Change —America Transforms Itself—1900-1950." In it he develops the interesting theory that this raising of mass income is due to what he terms the dynamic logic of mass production.

This, he says, is the principle that the more goods you produce, the less it costs to produce them; that the more people who are well off, the more they can buy; and the more they can buy, the more they make this lavish and economical production of ours possible.

A nation of men and women secure against exploitation and poverty, according to Allen, is a nation of delighted buyers of goods to everybody's profit. We have found that it pays better to produce the same sort of food, clothing and equipment for all income levels than to produce luxury goods for the few. Therefore, it follows that one can make money by lowering class barriers. Thus, he says, is Marxism confounded, not by dogma, but by capitalism turned to democratic ends.

Relation of Profits and Risk

Note Allen's emphasis on the key role of profits. He talks about "everybody's profit," things that "pay better," and how "one can make money." Note, too, that there is no such thing as unreasonably high profits as long as they are earned competitively in free markets.

For on the one hand, high profits are self-corrective since they encourage new producers to enter the market.

Equally important, the prospect of *high* profit rewards is necessary in our system to encourage people to take wild and speculative gambles in new enterprises, to risk their time and money in the innovations, new ideas and new ventures which are so essential if we are to keep our economy moving upward. I suppose that if Henry Ford had not gambled his time and his associates' money in developing the motor car, we might all be walking or riding bicycles today.

Recently Benson Ford told something about the risks involved. Speaking in Chicago this Spring, he said that there have been 2,726 makes of automobiles since the invention of the motor car. Of these, only 18 survive today.

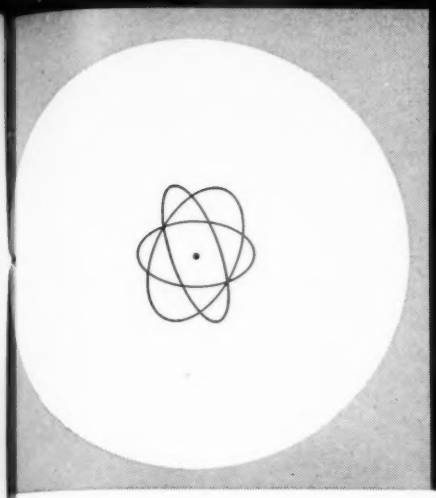
As another example, DuPont is said to have invested 27 million dollars in the development of nylon before it knew whether it had a saleable product.

Now you cannot buy risk-taking of this magnitude, of the magnitude so frequently required in business, with a low or a fixed return. True, some investors are willing to loan money at fixed interest rates in return for some limitation of their risk. But every business needs the support of people who are willing to gamble their savings in the form of ownership capital, who are willing to stake all on the success or failure of an individual enterprise.

Telephone Industry's Part

I would be remiss in my obligation to you and my business organization if I failed to discuss the special place of

(Please turn to page 63)



TELEPHONY'S ELECTRONICS SECTION

BY HAROLD B. McKAY, ELECTRONICS EDITOR

ELECTRONICS AT USITA CONVENTION

THE FACT that the electronics age has reached the telephone business was much in evidence at the USITA convention in October. Strangely enough, this evidence was not because of a lot of hoopla about the subject, but rather because of a lack of it.

This was in contrast to the USITA show of a year ago, where some of the manufacturers displayed elaborate electronic switching systems. These exhibits were laboratory models, made for show purposes. Two companies had working exchanges over which visitors could dial any one of a half dozen telephones, all without benefit of switches, relays or other moving parts.

The 1957 convention had none of this. Electronic equipment is now standard and is no longer a mere novelty. One exhibitor, for example, displayed a magnetic tape toll ticketing device. No one made any particular effort to stress the fact that it was an electronic beauty. Rather, everyone seemed to take it as a matter of course.

Nevertheless, those who were bold enough to open the cabinet found that the latest techniques of electronic circuitry, including switching and gating circuits, were used in the device.

At another display an automatic intercept machine was being shown. This was a device—an electronic memory—which could keep track of all the working and all the vacant numbers in an office. When a call is placed, this gadget checks the dial pulses, finds out if it's a good number, and either completes the call or routes it to an intercepting operator. The beauty of the thing was the fact that it did not even have to be placed in the office involved. It could be placed at a main office or toll center or wherever the operators were located.

It would still check the calls to a distant, unattended office and route them as required. Thus it does not require a visit to the office to change a number on or off intercept.

These were all good selling points, but taken for granted was the method by which it worked. A matrix of tiny holes on a board provided jacks into which crystal diode rectifiers could be inserted. A small gadget, no larger than a paper clip, when bridged across two of the holes or removed, made the difference between the working and the intercepting lines.

Actually, the tiny crystals were being used as electronic "gates," that is, jumper connections which passed current and energized circuits when required and rejected current under other conditions.

This method not only makes for simple and more reliable circuitry, it also greatly simplifies the work operations attendant to changing lines from working to intercept status or vice versa.

Instead of re-arranging jumpers, using a soldering copper and running the danger of causing trouble, a crystal diode can be placed or removed as simply as sticking a pin in a map, and this is done, not on the subscriber's line, but in an electronic memory which might not even be in the same town.

CROSSBAR

Another development in the electronics field is in the line of crossbar equipment. Crossbar, of course, refers to a switch, and any kind of system which uses this switch type can be called crossbar. A wide difference in types of crossbar offices exist in the industry, however.

Some of the earlier equipment which was made available to the Independent industry was actually of a step-by-step nature. That is, the call progressed with the pulls of the dial, but used crossbar rather than rotary type switches. The Bell System used "common control" in their crossbar offices, much like that used in the panel system. This method permitted the control equipment, which interpreted the dialing and completed the call, to drop off the circuit once the connection was established, thus tying up less equipment.

A feature of crossbar has been that the subscriber lines did not have to be in numerical sequence. That is, the incoming common control equipment could locate the line by switch and vertical rather than by directory number. This feature necessitated a large memory network of jumpers which would direct the incoming call to the part of the building where the number was terminated.

At the convention, a new type of crossbar was shown, which uses a memory matrix similar in notion to the intercept system described above. A flat panel contained a multitude of two-springed contacts which peered from tiny jacks, like the open ends of bobby pins. Into these a small wafer, smaller than an aspirin tablet, could be plugged.

The wafer was a specially developed diode, which would pass current in one direction only, and was a complete little unit in itself, with no connecting leads. In use, one of these wafer rectifiers is clipped into place and this serves to direct the crossbar switching equipment into the right channels to complete the call. The information can be changed

at a moment's notice by merely changing the wafer from one jack to another.

Yet, all of this seemed matter-of-course at the convention. The men at the displays were proud of their equipment of course, but electronic switching was merely another feature.

CARRIER

THE transistorized carrier is no longer a novelty and conversation piece. It is a standard item of merchandise, tried and proven, and several manufacturers are in this field.

The printed or etched circuit is a widely used item and is so common now that salesmen often do not even mention it. These circuits consist of thin plastic sheets with tiny resistors, condensers, diodes, even small vacuum tubes soldered in place. The plastic sheet fits into the equipment boxes like shelves in a pantry. When one wishes to add a line, a channel, a circuit of any kind, he merely slides a new shelf into place.

The circuitry lends itself to some repair operations, but a big advantage is that trouble can be quickly located by merely pulling out one complete circuit and sliding a known-to-be-good unit into place.

The electronic age will mean easier and simpler maintenance, not only because the absence of moving parts will avoid trouble, but because the sectionalized nature of the components will permit easy exchange of parts. Also, as new devices are developed, the electronic design will permit construction in automated factories. This will reduce much of the painstaking hand work that now goes into telephone apparatus and will go a long way towards keeping costs down.

DATA CIRCUITS

MORE data transmission circuits could result from schemes like the one worked out by several fire insurance companies. These companies needed the use of an IBM computer which costs over 1 million dollars. They formed a separate company to handle data processing. This will enable the several companies to share the use of the IBM machine.

This idea will probably spread and result in more companies whose business will be to rent the temporary use of electronic data machines to small business men by means of telephone data transmission circuits.

ANTENNA SYSTEMS

A RUGGEDLY constructed antenna for a telephone company radio system is a must. This is true because the antenna is not a unit that can be readily replaced like a tube, nor is it a device which can be easily repaired on the job if it corrodes or breaks. In addition, telephone companies usually use radio in locations where wire lines are not practical, which usually means the antenna is subjected to the most severe weather conditions.

To answer this problem a line of antennas has been designed by the Scala Radio Co. which has a particular appeal in the telephone field. The antennas include ground plane, yagis and corner reflectors and are made to standard frequencies or to special frequencies on order. Some are adjustable on the job for final trimming to frequency; all are constructed so that they may be assembled in little time and without special tools.

For heavy icing areas a unique design is offered which features electrical heating units inside of the antenna elements. The installation includes a thermostat which monitors the outside temperature and turns on the heaters as required.

Baluns

Balanced antennas, such as yagis, may sometimes be fed with coaxial transmission line. The coaxial line is unbalanced, hence a matching device must be used to couple it to the antenna. Such a device is called a "balun" (from *bal*ance-to-*un*balance). It may be constructed from a length of tubing or transmission line cut to a critical length which serves as a transformer.

A balun must be installed right at the antenna, so it involves electrical connections to both the coax cable and the antenna. It can easily be a source of trouble because of weather conditions. Scala solves this problem with a specially constructed balun which is potted in plastic to resist damage from the elements.

These antennas also feature the use of castings and inserts which minimize vibration of the tubular elements in the wind. Each antenna is tested at the factory and has a voltage standing wave ratio of less than 1.3 to 1.

A brochure describing these antennas can be obtained from Scala Radio Co., 2814 19th St., San Francisco 10, Cal.

PARTS CATALOG

THERE was a time when telephone equipment was in a class by itself —it didn't even look like anything else, and nobody but a telephone man could tell one part from another. The latest trend in manufacture is the use of radio-type components where these will do the job.

Most noticeable in new equipment is the use of radio carbon resistors in place of the older card type wirewound devices.

In addition, selenium rectifiers, crystal diodes, transistors, transformers and tubes are finding increasing application in the new equipment. All of these things are radio as well as telephone in nature, and many telephone companies are obtaining their repair parts from radio stores.

It would, therefore, seem that the well-equipped telephone office of today needs a radio catalog on their bookshelf of literature. One of the most complete catalogs of this sort which is available today may be obtained free of charge from Allied Radio, 100 N. Western Ave., Chicago, Ill. The catalog includes test equipment and do-it-yourself kits as well as radio parts listings.

DIAL MOBILE SERVICE

ANOTHER new development in dial service for mobile radio-telephone service was described in a paper presented before the American Institute of Electrical Engineers in Chicago. The new dial equipment is to be installed in a pilot system for the Rural Electrification Administration on the Florida Telephone Co.'s property at Branford, Fla. Later it will be transferred to another exchange.

The paper was presented by R. P. Dimmer of the Automatic Electric Co., who declared that the new system would serve rural areas by providing service to isolated ranches or islands that cannot be reached by wire lines, and for farm vehicles as well as boats, autos and planes. The equipment would also be of use in providing quick temporary telephone service in places where the expense of wires and poles would not be warranted.

RADIATION DETECTOR

IF YOU are concerned about your safety from atomic radiation, you will be interested in a little gadget called the GARD. The device is a small viewer which is held to the eye, and which contains a material which is sensitive to radioactivity. If you think you are in a radioactive region, you just take the GARD out of your pocket and peek. If you see one rectangle you are safe; if you see two, don't linger; if you see three, scram. Sometimes in a radioactive region, merely moving a few feet is enough to put you in a safe place.

You can get a brochure describing the GARD, or buy one for $7.50 from the Sargent-Rayment Co., 4926 East 12th St., Oakland 1, Cal.

TRANSISTOR CONNECTIONS

ONE of the problems which has been encountered in the development of transistors and other semi-conductor devices has been the matter of fastening leads to them. While wire leads can be soldered to some kinds of components, soldering to a tiny piece of germanium can be a different matter. Actually the weakest part of some of these devices could be the connecting leads.

Research at Bell Laboratories has shown that a combination of heat and pressure can result in a firm bond between various soft metals and single crystal semi-conductor surfaces.

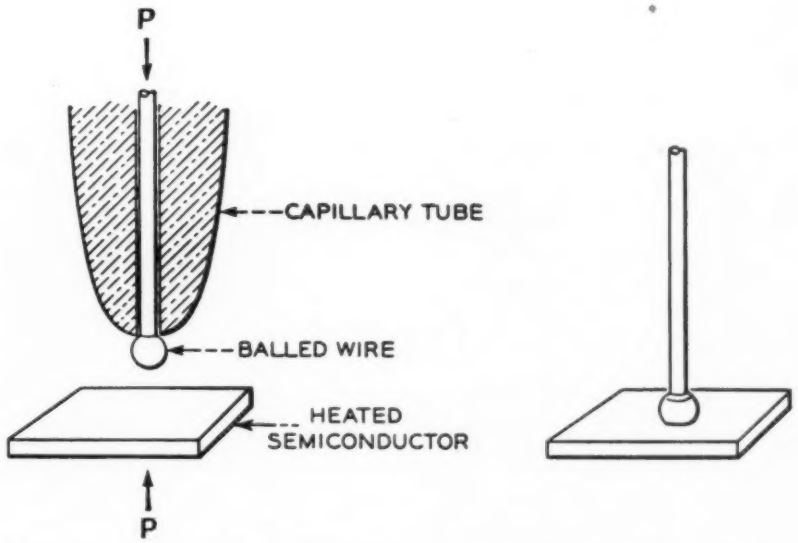
In one method used, a wedge-shaped tool is used to pinch the wire against the crystal. Pressures of 5,000 pounds per square inch and temperatures of 200° C. result in a solid joint in a few seconds.

Another technique calls for the use of a wire which has a ball formed at the end. This ball is pressed and flattened against the crystal and adhesion results. A gold-germanium bond so far appears to be the easiest to make.

PULSE ECHO TESTING

THE PULSE echo means of locating trouble on wire lines has been used for some time by power companies, and more recently by telephone companies. It works by sending a pulse along a line which reflects from faults or discontinuities. The return time of the pulse is measured on an oscilloscope and the distance to the fault made known.

A limiting factor in this method has been the attenuation of very long lines which weakens the pulse, and causes the returning echo to



Pictorial representation of the thermo-compression bonding technique in which balled wire is attached to a semi-conductor material.

merge with the background noise. This has restricted the use of this method in cable circuits in particular.

Now a patent, No. 2,800,627, has been issued which covers a means of accumulating or storing the returned echoes over a period of time, without having the noise accumulate at the same rate. This makes it possible to use the device on cables which are beyond the length where echoes are no longer perceptible. The device is matched to the cable by a balancing network, similar to that used in telephone repeaters.

The invention, by Jean Oudin and Georges Comte of Lyons, France, is assigned to Compagnie Generale d'Electricite.

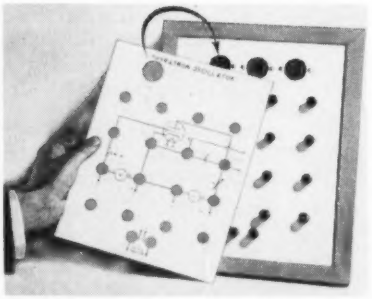
ELECTRONIC TRAINING

THE RAPID march of electronic techniques is being matched by new teaching techniques. Schools and teachers are developing new methods of training men in the new sciences. The manufacturers are also in the act, and are turning up new devices which will aid in this training.

One such system consists of a board about 10 by 12 inches in size. It has three tube sockets mounted permanently on it. These are wired beneath the panel to a set of binding posts. Thirty-eight charts are available for use with the panel. These charts include circuits for basic diode, triode and similar tube circuits, and functioning designs of various types of oscillators and counting circuits.

In use, the desired circuit chart is placed over the board, and the component parts wired in. Thus, the pattern formed by the parts become a working "live" circuit diagram. Blank charts are also available for use with the unit so that instructors can make up their own circuits.

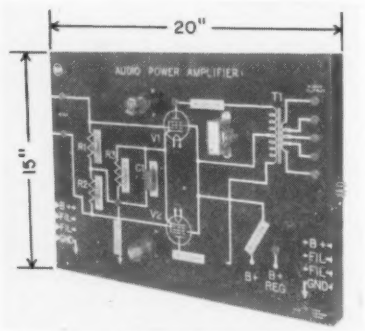
A circular describing this system can be obtained from Kepco Laboratories Inc., 131-38 Sanford Ave., Flushing 55, N.Y. The device is called the Model 104 Electronics Circuit Panel.



This is the Kepco training panel. Different circuit cards can be placed over the binding posts.

Another approach along these lines is a more elaborate arrangement made by RCA for military training. An old hand at "breadboard" training circuits, RCA has developed a system of cabinets, racks and panels which demonstrate not only basic circuits, but complete operating units like radio receivers and transmitters.

The appropriate panel can be put in place on a cabinet, and the various circuit components hooked into place. Different units may be substituted in order to observe the effect of changing values. The RCA training unit is in use in several telephone company plant schools. Information describing this system more completely may be obtained from J. Kingan, manager training devices, RCA Service Co., Camden 8, N. J.



One of the panels used in the RCA training equipment. This panel shows the circuit diagram with parts mounted in place.

On another front, Lenkurt Electric Co. has prepared a kit for telephone companies who want to conduct carrier schools. The package is patterned after the system used in Lenkurt's own school in San Carlos, Cal. A general course on all 45-class equipment is available, and separate training material is available for each equipment type.

The training material consists of an instructor's manual with a master outline, reference publications, student reference manuals, visual training aids, quizzes and final examinations. The training plan is keyed to the use of standard instruction manuals, so that the student will work with the same material he will later use on the live equipment.

Information on this training material can be obtained from the Lenkurt company or Automatic Electric Co., Northlake, Ill.

SILVER MIGRATION

THE problem of silver migration in electrical apparatus is discussed in the second quarter (1957) issue of the Stanford Research Institute Journal. This condition is well known to telephone men who have experienced trouble when the silver on terminals in multiple banks crawls over from one terminal to another causing crosses and shorts.

Both Bell Laboratories and the Signal Corps Engineering Laboratories have been concerned with the problem, and it is for the latter organization that the Stanford institute has been making a study.

The reason silver migrates is that the metal ionizes in an electrical field by losing an electron. It can then go into solution in the tiny, undetectable amounts of moisture which are on or in the plastic insulators.

Normally, metals like copper do

not migrate, because an oxide forms which may be a poor conductor and which is insoluble, thus preventing, both electrically and physically, any more of the metal from dissolving.

With silver, however, the oxide is both soluble and conductive, so it goes in solution and drifts toward whatever part of the circuit becomes the cathode in the electrolytic action.

More silver dissolves in the moisture and follows the first. Either light or chemicals in the plastic can cause the silver oxide to "reduce" or revert back to metallic silver. This leaves a thin metallic film on the insulator which causes trouble.

The Stanford Institute study indicated that silver migration could be reduced by the use of plastics that do not permit moisture to accumulate and by using silver which has been alloyed with certain amounts of copper.

It was also pointed out that migration increases with temperature, but ventilation systems which reduce temperature by adding more moisture to the air could cause an increase rather than decrease in the rate of migration.

The SRI Journal can be obtained for $1.00 a copy from the Stanford Research Institute, Menlo Park, Cal.

WAX BATTERIES

THE National Bureau of Standards has developed a tiny wax-electrolyte battery suitable for condenser charging and grid-biasing service. Each cell consists of a disc punched from a sandwich of sheet zinc, a conductive vinyl film and a separator impregnated with a zinc chloride-polyethylene glycol mixture. The separator is coated on one side with manganese dioxide.

A 25-cell, 37.5-volt battery is smaller around than a dime, and only a third of an inch long. Tests have indicated that the battery can hold its EMF after three years of storage. The battery was developed for the Army's fuse laboratories. The object was to obtain information about batteries for specific ordnance applications.

•

ELECTROLYSIS—An eight-page bulletin (No. 86-5) of pH electrodes and meters for measuring soil or other substances for acid-alkali conditions is available from the Scientific Instruments Division, Beckman Instruments, Inc., Fullerton, Cal.

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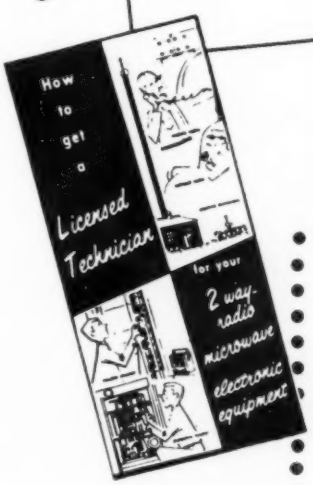

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Data Transmission

By HAROLD B. McKAY, Electronics Editor

Part 2

HOW DOES the increased use of computers affect telephone companies? It so happens that much of the information used by these machines is sent in from a remote point. At the beginning of 1957, there were about 600 IBM data transceivers installed, and 500 of these were operating over telephone circuits. The other 100 were on telegraph circuits and overseas radio circuits. Data is being transmitted daily from machines located in Europe, Alaska and Japan. IBM now has orders for over 1,500 more of these machines.

Some of the systems using wire lines have been well publicized. Sylvania Electric's Univac computer in Camillus, N. Y., links together 85 branches, sales office, warehouses and laboratories in 61 cities. Over 20,000 miles of leased telegraph circuits are used for this. The machine handles customer's orders, stock inventory and payroll. In the latter function, it can process 20,000 checks in three hours.

Another large machine is being set up for the U. S. Army Signal Corps. It will be used for logistics and it can make 30,000 logistic decisions, 8,400 additions or 1,200 multiplications in a second. It can handle 8,000 cards a minute and will keep track of 150,000 items of equipment that are stored around the world.

Computers will not be the only devices demanding telephone lines in the future. The art of telemetering which was used by telephone companies, themselves, before computers were invented, is seeing more use.

Pipeline companies, railroads, water companies, power companies now use these kinds of circuits to transmit reports of load conditions, liquid levels, pressures, temperatures and such from unattended points to headquarters.

New techniques in this field, such as digital telemetering, may extend the use of this idea, and more use of telephone lines for data transmission will result.

The jet age in the air also poses a problem in data transmission. Even disregarding the military aspects for the moment, civilian aircraft are increasing in speed and numbers to a point where the traffic handling problem is enormous.

The thing that makes it complicated is the speed with which the answers must be developed. At 600 miles per hour a decision made a few seconds too late may mean a collision. Obviously, computers will be used to handle the air traffic problems, and to compute safe routes and landing patterns.

However, such machines will necessarily govern the flight of many aircraft over an area of thousands of square miles. This means that much of the data will have to travel from one point to another over telephone lines.

Errors

Every system developed by man is subject to errors, because man himself makes lots of mistakes. Errors in various systems can be detected by various means, some of which are called feedback systems. The furnace thermostat in a home is an example of this. You may set the thing for the temperature you would like to have. The furnace tries to make this objective. If it scores a near miss, the thermostat reports the result back to the furnace and turns it up or down to make the correction.

Man's body has many reflexes and senses built into it which do the same thing, like the pain in your thumb tells you that you missed the nail with the hammer.

Data transmission systems may also have error detecting systems built into them. Some, like the IBM transceiver, will merely stop and sound an alarm if defective information is received. The person operating the machine merely has to reinsert the punched card being transmitted and start it off again.

However, in systems involving aircraft, or more particularly with the SAGE data transmission system, knowledge of an error may come too late to save a life—or a country.

It is, therefore, important, very important, that good facilities be provided for this type of transmission.

The amount of data which may be transmitted over any medium depends upon the quality of the medium. In the case of a wire line, the bandwidth and the signal to noise ratios will be very important. Of great significance, also, will be any distortion, either phase or amplitude, which may be present in the system.

Theoretically, an ideal circuit with a bandwidth of 3,000 cycles and a power-to-noise ratio of 20 db should have a data handling capacity of 20,000 bits of information per second. Actually, nothing like this rate has been obtained in working systems, because of the limitations of the telephone line.

The transmission of voice over a telephone line is possible under a wide variety of conditions. Very narrow bandwidths can be used; the voice may sound funny, but it can be understood. We can shout down noise on a circuit and get the message through. Impulse (pops and crackles) bother some people not at all, and phase distortion on a circuit is not ordinarily detected by the ear.

Among the reasons for this is that speech has a great deal of redundancy in it. That is, we transmit with our voice, much more data than is actually necessary to carry the information. Speech is actually a wasteful use of a circuit. (And sometimes a waste of time.)

However, because of this, it is possible to have an automatic telephone system that will assemble a random collection of facilities at the turn of the dial, which will be usable for speech purposes. This simplifies the plant considerably because of the many different kinds of equipment and facilities that can be patched together for a voice circuit.

COMPILATION OF EXISTING DATA SYSTEMS

March 26, 1957

BASIC TELEGRAPH SYSTEMS

Manufacturer	No. of Channels	Spacing	Type of Keying	Total Bandwidth Required	Bits per Second	Notes
A. T. & T. Lenkurt Signal Corps.	16	170 cps	F-M & A-M	340-3060	1187	100 wpm/channel
Western Union	20	150 cps	F-M	300-3300	1136 1484	75 wpm/channel 100 wpm/channel
Collins Kineplex	40	110 cps for 2 ch.	Phase-shift	550-2750 delay equalized	2968	All 40 channels must be synchronized. Makes use of special synchronizing signal to effectively regenerate all channels. All channels must originate and terminate together.

VOICE CHANNEL DATA SYSTEMS

IBM Card-to-Card Transceiver	4 ch	450 cps	A-M	650-2450	720 bits/second (180 bits/channel) Transmits 11 cards per min.	Works on leased toll circuits with echo suppressors removed. Uses 4 out of 8 code which includes two error checking bits for each 6 information bits.
A. T. & T. (experimental)	1 ch	—	F-M	700-1600	750	Designed to work over any telephone circuit which may be dialled-up with error rate of between 1 in 10^4 and 1 in 10^5.
A. T. & T. Teletypesetter	1 ch	—	A-M	1000-2800	510	Phase delay equalization required.
SAGE	1 ch	—	A-M (Vestigial Sideband)	500-3000	1600	Phase delay equalization required from 1000-2500 cps. Sensitive to impulse noise. Error rate of less than 1 in 100,000.
W. U. Sub-band	2 ch	1500	F-M	300-3300	1800 bits delay equalized 1500 bits un-equalized	Under development. For operation on same voice channels as Western Union Telegraph Systems. These voice channels are not the ordinary "dialled-up" channels but are special for W. U. Telegraph.
Signal Corps AN/TSQ-7 AN/TSQ-8	1		A-M Double Sideband	975-2500	750	Delay equalization required.

(Table prepared by M. E. Ferguson, Lenkurt Electric Co.)

When the day comes that a business man will want to dial up a number and then connect his computer to one in a distant city, the story will be different. F. R. Kappel, president of the American Telephone & Telegraph Co., has declared that as time goes on, the amount of communications between machines may become as great as the amount of communication between people.

Poor Circuits

Many present-day telephone circuits, although satisfactory for speech, simply will not handle data circuits. One user of leased telephone facilities has declared that, while many telephone companies like to think they are offering 3,000-cycle channels for such use, this quality of a circuit is an exception rather than rule.

Even large telephone companies have been surprised to find out that they have been unable to furnish a circuit good enough for SAGE.

In addition to bandwidths that are too narrow, impulse noise has proved to be intolerable in some locations where transmission had been thought to be good. This noise may originate from lightning bursts, dial switching equipment, intermodulation on carrier or accidental conductor contacts, among other things.

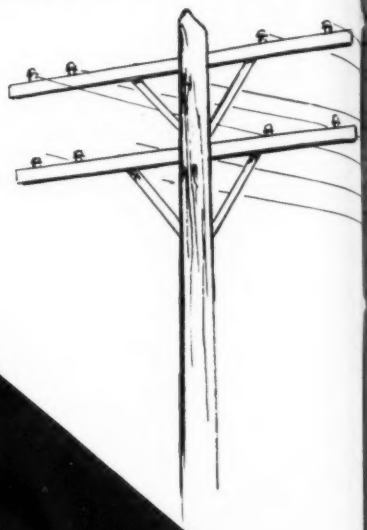
Voice channels have equipment which is designed to minimize the effect of the physical line limitations. Some of these things will not work on data circuits, because their basic principle of operation is that of fooling the ear. It is harder to fool an IBM machine.

The compandor arrangement used on carrier circuits is an example of this. This device compresses the amplitude range of the speech before it is sent on the line. It does this by making the loud sounds weaker and the weak sounds stronger.

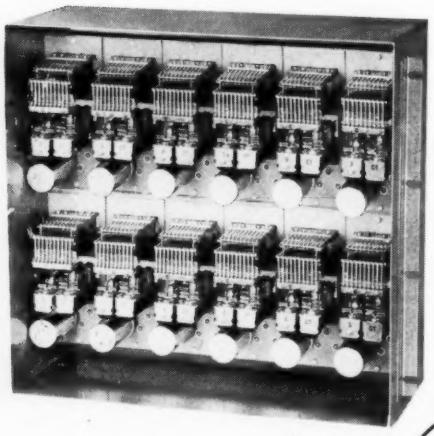
At the receiving end, the reverse takes place, putting the voice back to its original range. The compandor does this at a syllabic rate; that is, it is

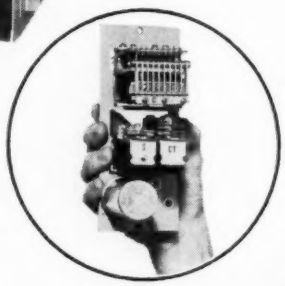
(Please turn to page 65)

For *Modern* Party Line Operation →



Typical relay case
for Ringing Converter





Relative size of
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*Pat. Pend.

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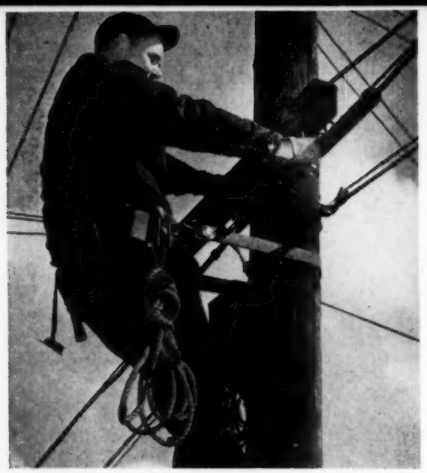

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

OUT IN FRESNO, CAL., the Pacific Telephone & Telegraph Co. has announced that it is planning to step up its battle against one of the oldest and most persistent telephone problems—the wrong number. It is reported that since new prefixes and direct distance dialing have come into use, wrong numbers have been on the increase. At the present time, the chances are about one in 20 that the next time a Fresno subscriber answers the telephone it will be a wrong number.

For Fresno that means that there are almost 40,000 wrong numbers in the 800,000 local calls placed daily. To help solve the problem, three operators are working full time calling and instructing customers, and a wide-spread advertising campaign is being launched.

It is very gratifying to note that at least one large operating company has finally recognized the wrong number evil and is attempting to correct it.

•

We have a very nice letter from Mrs. R. Fred Fairly, of Kansas City, in which she states: "Just a thank you note for all the wonderful pictures and reports contained in the Oct. 26 issue of TELEPHONY. Since I did not attend the USITA convention this year it was a great pleasure to see so many friends caught by your camera and to scan the reports. I think you did a marvelous job." It was signed: "A Stromberg-Carlson Wife."

•

We also have a letter from John Blain, of Vancouver, B. C., in which he mentions our vacation trip to Canada last summer and states that we missed the best parts of Canada when we did not visit British Canada. We hope to do that some other time.

Mr. Blain inquires as to where our branch of the Blain family came from and states that he migrated from the North of England some 40 years ago. It is possible that we are distant relatives as our branch of the Blain family was supposed to have originated in Wales. The records indicate that the first of the family to come to America is believed to have been James Blain, who migrated from Londonderry, Ireland, before 1745 and settled in Cumberland County, Pa.

•

The lady of the houshold is no longer referred to as a housewife or homemaker. The present-day preferred term is "domestic administrator."

•

A showcase on wheels is a new telephone merchandising display vehicle now being tested for the first time by the Southwestern Bell Telephone Co. This specially designed truck carries a large stock of supplies and instruments and is used for promoting sales during changeover of instruments in towns being converted to dial.

A crew with a foreman and installer drive the display vehicle into a neighborhood. While they install dial sets, customers are invited to look over the color telephones and other convenience items in the showcase windows. If they decide on a bright set, it can be installed in the residence immediately from the truck's supply.

In many small towns, the event of the day is going down to the station and watching the train come in.

People in The Pentagon in Washington, D. C., are not much different since they go down to the Heliport and watch the helicopters come in.

•

We were pleased to receive a letter from H. H. Snelling, PBX repairman for the Bell Telephone Co. of Nevada in Carson City, who gives us his ideas on how a two-pair drop wire should be designed.

He would like to see it with two regular conductors and two of No. 14 copper of Copperweld—actually, a combination service drop and C-Rural wire. The two-pair could then be used on those long pole-to-building spans, occasionally necessary.

In addition, there are many applications where it could be used with key systems. One is an off-premise intercom station where a third wire is necessary as a ringer lead.

Another use he cites is on buildings where a good protector or signaling ground is difficult to obtain. Here, the No. 14 conductors could be used as ground connections to the messenger strand.

Mr. Snelling also reports that he comes from an old telephone family. His grandfather built the first exchange in Olathe, Kan. On this job he employed his four sons and two daughters. The sons migrated west and worked on various telephone jobs in Arizona and Southern California. They also built the exchange in Hermosillo, Mexico. His father worked 40 years for the Sunset Home and Southern California Telephone Co. His mother did a stint as plant clerk with this company.

Mr. Snelling has 10 years' service and his young son is looking forward to the time when he can help his daddy dig holes and set poles.

•

The Sixth Annual Symposium on "Technical Progress in Communication Wires and Cables" jointly sponsored by the industry and the U. S. Army Signal Engineering Laboratories, will be held Dec. 3, 4 and 5 at the Berkeley-Carteret Hotel, Asbury Park, N. J. Of interest to operating companies will be papers on wire and cable for direct burial, underground distribution plant in urban areas, experiences with self-supporting plastic cable, cable splicing and several other similar subjects. Anyone desiring further information should contact Howard L. Kitts, Chairman Symposium Committee, Communications Dept., USASEL, Ft. Monmouth, N. J.

Design and Operation of Small Companies

By R. J. POLLOCK

Part 7
Central Office Equipment

IN THE previous article, covering buildings (TELEPHONY, Nov. 23), it was implied that the construction should be such that it would meet the demands for present and future service without costly changes in or additions to the buildings at a later date. This is also a requirement as far as central office equipment is concerned, for many reasons.

Many telephone engineers design plants which incorporate the complete replacement of all property at the time of a conversion so that after the cut-over no further work will be necessary for some time to come. Such a plan might be advisable if the necessary financing is available, and if conditions require concentration on a particular job so that the installation and construction forces will be available for other job commitments.

Normally, a small telephone company would not be confronted with problems of that kind and, therefore, it would be able to spread the expenditures for plant facilities over a longer period of time. However, the duration of this spread will have a direct effect on company earnings, if the plant investment is increased in an appreciable amount far in advance of the rate increase necessary because of the complete rebuilding program.

Customer demands may affect the planning as far as the type and size of central office equipment is concerned in the smaller exchanges and could be the determining factor in a decision to continue on a magneto or common battery basis for some time after the outside plant has been rebuilt, providing, of course, that traffic operating costs on a 24-hour basis, are within normal limits.

The financing program can be spread out if, in the rehabilitation program, a building is constructed to house automatic equipment, although it is not purchased at that time. In its place a reconditioned common battery board could be secured at a considerable reduction in cost when compared with new equipment. This course could require the purchase of the associated main frame and power equipment which would be used in the ultimate conversion to automatic operation. The difference which would result in the annual carrying charges would go a long way in offsetting the cost of the common battery board, and the necessary telephone instruments could be purchased without dials which could be added if and when the automatic equipment is installed.

This procedure at first glance may appear cumbersome; it is not followed by larger companies because time usually is of vital importance, and because an instantaneous cut-over is necessary in view of the number of stations involved. In the smaller localities and, for that matter, in many of the larger ones, the customer will not expect a conversion which does not include some service outage, and by placing a temporary trunk cable between the old magneto board and the common battery unit in the new building, the conversion can be carried out on a line-by-line basis. This, of course, will necessitate double operator costs which will be insignificant when compared with the savings derived from eliminating many duplicating station installer functions, which are involved in a straight magneto-to-automatic conversion.

In an instantaneous cut-over with harmonic ringing equipment, the following steps must be followed to accomplish, as far as possible, a conversion in which the troubles encountered are reduced to a minimum:

(1) Make up station cut sheets.
(2) Inspect each existing station and rewire where necessary.
(3) Install new instruments.
(4) Leave old instruments in place until after the cut-over.
(5) Place a jumper wire between the old and the new instrument (to be cut at conversion time by the customer).
(6) After the cut-over, remove all old-type telephones.

Under steps (2) and (3), it will be necessary to have the outside plant force expend labor and truck mileage to accomplish the work, which will consist of visiting each customer's premise for the actual installation work and, in the case of party lines, they will have to return to each location to remove the magneto stations from the complete line in order to facilitate dial testing, after which they must again be reconnected to the old board until the cut-over date.

If during the cut-over one customer on any party line does not cut the jumper wire in step (5) (and that will happen), it will require an extra trip by a plant man to place the line in operating condition.

A final trip will be necessary to remove the magneto instrument after the conversion.

The additional labor, truck mileage and supervision necessary to correlate the complete operation are expenditures which cannot be avoided, but which will be added to the cost of the job, and ultimately will appear in the rate base structure. Those extra costs will be greatly reduced in any conversion which is done on a line-by-line basis, since many of the above plant functions will be handled on the same trip at a considerable reduction in labor hours.

There are many objections to following a plan of this kind, but, in the case of the smaller company, the logic is very evident when we consider not only the resulting savings but also the technical developments which have taken place within the immediate past, affecting mechanical office switching equipment both for local and toll facilities. While meeting the local service requirements may not be a problem, the final plan, especially if nation-wide toll dialing becomes a part of it, might call for some costly replacements. Some small exchanges may never become a part of toll dialing network, since their size and location, along with local conditions, would not make it advisable for them to do so. However, it appears that, ultimately, there will be very few exceptions so that advanced planning should consider the toll dialing program when automatic operation is contemplated. This will require negotiations with the Bell company in order to secure an exchange name and code number designation to be incorporated in the switchboard specifications in accordance with the national numbering scheme.

This brings up the question, "Why

is central office mechanization being planned at this time; what economies, if any, will result; is the conversion being considered because it appears to be a nation-wide trend?"

In other fields of endeavor, the manufacturers attempt to bring out new designs each year, as in the automotive field, which make last year's model out of date, and many buyers purchase new cars every year for no other reason than to be following along with the trend. It is possible that some of the recent automatic installations were made without studying the after-conversion results. Manual operating costs will be reduced by "going dial," but in their place many new ones will appear and they could equal or exceed those which were eliminated.

The maintenance of automatic equipment, along with the outside plant, will normally be above that for manual equipment. The maintenance costs might not be so great in the small exchange where the owner may be the general manager, switchboard repairman, testboard man, trouble shooter, station installer, groundman, lineman, personnel manager, auto mechanic, plant engineer or janitor, all rolled up in one. He may not be able to calculate and express in technical terms the transmission characteristics of a given circuit, but usually he can come up with solutions of problems in accordance with accepted standards. In the same way, his knowledge of over-all operating conditions is such that when the decision is made to "go dial" the matters of increased operating costs and additional revenue will be considered in the long-range planning.

Much of the required information on the operation and maintenance of automatic central office equipment is secured from the equipment manufacturers.

It is important, however, for the small company owner to realize that maintenance problems on automatic equipment will be encountered, along with those which will come up when additional lines are added, and this point should be fully considered because of the effect they may have on operating costs after the cut-over.

One factor to be considered in converting to automatic operation is whether the equipment should provide terminal-per-station or terminal-per-line operation. Numerous articles have been presented on this subject and we will not go into the advantages or disadvantages of either in these articles.

Another factor to be considered in converting to automatic operation is whether or not to install equipment which will limit the length of conversation on any call. This feature can cover all lines, or be set up to cover only party lines and, while it will accomplish a certain purpose as far as a few customers are concerned, in the over-all picture it might tend to have an adverse effect on public relations and, incidentally, on revenues in connection with nation-wide toll dialing. Regrouping, selling new service and upgrades, and conducting education programs to persuade subscribers to keep the time on their calls to a minimum appear to be the more logical course, especially where toll users are not involved.

The type of ringing incorporated in the new equipment is another factor requiring considerable study. While code ringing, in the light of present-day customer living standards, should be considered as obsolete, the semi-selective type is also rapidly approaching that point. The trend to reduce the number of customers per line, along with the changes in the standard of living of rural residents, both of the farming and non-farming type, makes it advisable to specify full-selective ringing.

The circuit length of rural facilities under automatic operation presents problems which are not encountered in a magneto system. The transmission may be satisfactory, but the long rural line loops may cause ringing and supervision trouble if the proposed board is not designed to operate under those conditions. However, in many instances, excessive long lines will be encountered which are beyond the economical design possibilities of any board, and in the majority of cases they can be handled by the use of special long lines equipment and by using copper or Copperweld line wire in place of iron.

The data covering all lines in the rural area will be available, as outlined in Part 1 (TELEPHONY, Oct. 12), and it can be incorporated in the switchboard specifications which are given to the supplier, so he can tailor the board to fit the exchange requirements.

The procedure outlined in Part 1 will

(Please turn to page 38)

SPACE B	SPACE A			
SPACE C				
SPACE D	1	1A	3	3A
	2	2A	4	4A

SPACE E

LINE FINDER NO		BUNCHING BLOCK NO		RINGER FREQ.				MISCELLANEOUS

CABLE NO	CABLE PR.	TERM NO	TERM PR	O.W. PR				STATION RECORD
								ORDER NUMBER
								DATE INSTALLED

STATION EQUIP.	MAKE	TYPE	CODE NO	STA. PROT.	STA. GRD.		MOVE	DISCON.	RECON.
MAIN STA.									
EXT. STA.									

TROUBLE RECORD

REPORTED	TESTED	NATURE OF FAULT	CLEARED	TROUBLE FOUND
A P	A P		A P	
A P	A P		A P	
A P	A P		A P	

Fig. 3

Copperweld LINE WIRE

TRADE MARK

keeps upkeep down

When Copperweld* Line Wire goes up, it's up to stay. Non-rusting Copperweld has the permanent high strength to resist even the worst weather conditions year after year. Thus, you get longer service life—lower operating costs. At the same time, you get better talking qualities, because Copperweld has the best electrical conductance of any long-span conductor. What more could you ask for in a line wire?

*Trade Mark

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

SOLD BY LEADING DISTRIBUTORS

RELIEVE YOUR GROWING PAINS

with General Cable Distribution Wire!

LOW-COST DISTRIBUTION WIRE

HELPS YOU EXPAND YOUR LINES

QUICKLY, EASILY AND ECONOMICALLY!

If your company is operating in a rapidly expanding community, distribution wire provides a quick, economical way to extend open wire lines or cable plant.

Here are some of the money-saving advantages of this wire. On new construction, it can be attached directly to the pole. For increasing existing pole line capacity, it can be attached to the underside of a crossarm or directly to the pole. Staggered pair lays minimize crosstalk. Long cabling lays permit easy attachment of support wire to pole.

The steel support wire has a breaking strength of 1800 lbs. and both the support wire and copper conductors are polyethylene insulated. Each of the conductors is again protected by a jacket of fully color-coded polyvinyl chloride. This provides all-weather protection and quick identification. We stock various sizes of distribution wire plus the associated hardware in all our warehouses—to help you get your job done *fast!* For complete information, call your Automatic representative or your nearest A. E. Sales Corporation warehouse.

DISTRIBUTION WIRE

	URBAN	SUBURBAN	RURAL
Pair	16	6, 11, 16	1, 2, 3, 4, 5, 6, 11, 16
Size	24 AWG	22 AWG	19 AWG

Automatic's 5 friendly warehouses:

George Ferguson, Mgr.	"Michie" Hester, Mgr.	Ed. J. Chok, Mgr.	Fran Batcher, Mgr.	Robert Miller, Mgr.
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Illinois	Richmond 21, Va.	Portland 10, Ore.	Johnson City, N. Y.	Kansas City 8, Mo.
Fillmore 5-7111	Tel. 6-9280	CApital 3-7244	Binghamton 7-8507	HArrison 1-4720

AUTOMATIC ELECTRIC

A member of the General Telephone System—One of America's great communications systems

GENERAL TELEPHONE SYSTEM

also supply the necessary data which will give the ultimate size of the new board, although it is not necessary to fully equip it at the time of installation. Present-day automatic boards are so designed that additional lines can be added with a minimum of effort, providing that it has sufficient capacity to meet the ultimate exchange load.

A local business with more than one business line may require rotary service at the time of conversion, or at a future date, even though the customer thinking at the time of the original survey does not indicate the necessity for it. The elimination of the operator, who actually performs that function on a manual board, may result in a request for it, providing the calling rate to the business customer is of sufficient volume. Studies of the traffic loads of multi-lined customer establishments will determine whether or not it is a requirement to be included in the switchboard specifications.

An additional revenue source in an exchange is derived from the installation of paystations so the board should be equipped with a tone on each paystation line for identification purposes by the toll operator at the toll center.

The location of the exchange in relation to adjacent population centers, or any other locations where community interest exists, will determine the necessity of establishing extended area service between them. If this type of service is feasible, provisions should be made to equip the new board with this feature. It will, however, require that the expenditures for the additional switchboard equipment, along with that expended for outside plant facilities to the distant exchange, be incorporated in the rate structure in such a manner as to reflect the loss in toll revenue which will result after extended area service has been established.

While the need for emergency generating equipment in small exchanges probably is not as great as it is in large exchanges, in some instances power outages occur which are of a duration beyond the carrying capacity of the storage batteries so that a power source will be necessary for continued operation. Local conditions will determine whether a portable generating plant is sufficient or, on the other hand, if a stationary unit should be installed which is connected direct to the main power source by relay equipment, which will place it in operation during any commercial power failure. The cost of emergency equipment of this type is not excessive and the operating costs are small, so that, from a public relation standpoint, the installation may be a very desirable addition to the telephone plant.

DATE 11-9-57 CUT-OVER SHEET SHEET NUMBER 1

FROM							TO					
ITEM	TELEPHONE NUMBER	PAIR NUMBER	TERMINAL NUMBER	CLASS OF SERVICE	CABLE NUMBER	NAME	ADDRESS	TELEPHONE NUMBER	PAIR NUMBER	TERMINAL NUMBER	CLASS OF SERVICE	CABLE NUMBER
1	110F2	5	T20	RR	A	H.J. SMITH	ROUTE 5	7-3712	7	T1	RR	2
2	110F5	5	T20	RR	A	ALFRED O. SMITH	ROUTE 5	7-3717	7	T1	RR	2
3	93F4	23	T20	RR	A	GEORGE BROWN	ROUTE 5	7-3713	7	T1	RR	2
4	93F2	23	T20	RR	A	JOHN A. BLACK	ROUTE 5	7-3718	7	T1	RR	2
5	88F4	14	T20	BR	A	LEO C. JONES	C.T.H. N	7-3719	7	T1	BR	2
6	110F3	5	T20	RR	A	PHILLIP MARSH	C.T.H. N	7-3715	7	T1	RR	2
7	91W	101	T4	R2	A	ROBERT C. OLSEN	102 8TH. ST.	7-2842	62	T8	R2	2
8	72W	107	T4	R2	A	NORMAN W. ROTH	106 8TH. ST.	7-2844	62	T8	R2	2
9	101W	181	T8	R4	A	OSCAR J. OLSEN	243 ELM ST.	7-3831	81	T10	R1	2
						HENRY M. JOHNSON	524 N. 2ND. ST.	7-3631	108	T17	R1	2
10	33	76	T3	B1	B	M+M SUPER MKT.	10 S. OAK ST.	7-2711	231	T30	B1	1

Fig. 4

Testing equipment is incorporated in the smaller automatic boards by the manufacturer which greatly simplifies inside and outside testing as far as its location with respect to the switchboard or outside plant is concerned. This feature greatly reduces the maintenance problem which might appear to be quite large in the smaller exchange when going from magneto to automatic dial operation.

In many cases, the installation of the automatic central office equipment will be performed by the manufacturer or other persons not connected with the operating company. Future maintenance problems can be simplified if the company maintenance people are assigned to work with the equipment installers throughout the installation so that they can become thoroughly familiar with the characteristics of the automatic unit. The training secured in this manner will be very beneficial in trouble-shooting after the cut-over.

While it may appear to be premature to discuss cut-over procedures in advance of those covering outside plant, the inclusion here will supply needed switchboard information and will act as a firm check on the planning for the ultimate size of the switchboard and the number of lines installed for use at the time of the cut-over. Any automatic board must be equipped with sufficient lines, selectors, and connectors to take care of the existing customers, the expected regrades, and the new business which will result because of the improved service. It is true that additional lines can be added with very little effort, but this increase should not occupy that portion of the board which is reserved for future growth. If it does, the full life expectancy of the equipment will not be possible. This might not be a problem of any consequence in a large company which can reinstall equipment in a smaller exchange, but in a small company it could be serious when we consider the cost of the board, along with the labor of installing it. It is, therefore, advisable that the cut-over procedure be set forth at least to the point where the actual customer load at the time of the cut-over has been determined.

There are a number of ways to handle a cut-over and each is dependent on the individual problems involved—in other words, it depends upon whether the transition is to be from dial to dial, common battery to dial, magneto to dial, or a progression conversion from magneto to common battery to dial. It is common to all methods that a customer list be set up to show all existing customers; the type of service, such as residence single lines, residence two and four-party lines, along with similar data for the business customers and those on rural lines. Any other services requiring a central office line should also be included.

A card should be prepared for each customer which should be used as a permanent record during the time the customer is a subscriber for telephone service. A sample of such a form is shown in *Fig. 3*, and it is suggested

(Please turn to page 65)

Fast, convenient, dependable

precision wave analyzers frequency-selective voltmeters

Sierra 121A Wave Analyzer

Sierra now offers exactly the instruments you need for wave analysis, wire carrier and microwave subcarrier applications.

Sierra 121A Wave Analyzer is a highly selective, double superheterodyne receiver covering frequencies from 15 KC to 500 KC and providing wave analysis data directly in voltage and dbm at 600 ohms. The instrument offers the selectivity required for use with new single sideband carrier systems.

Sierra 158A Wave Analyzer is similar but covers frequencies from 500 KC to 10 MC.

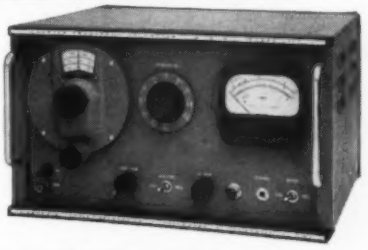
Both analyzers have high selectivity, accuracy of ± 2 db, spurious response at least 50 db down, and a signal-measurement range of 77.5 μv to 97.5 volts. The instruments are supplied in cabinet mountings which are readily adaptable to relay rack mounting.

SPECIFICATIONS — SIERRA VOLTMETERS

Model	Frequency Range—kc	Selectivity		Accuracy		Direct Reading in dbm	
		Down 3db	Down 45db	Frequency	Measuring	Balanced	Unbalanced
101C	20-500	± 550 cps	± 2900 cps	Note A	± 3 db	Note D	600 ohms
103B†	3- 40	± 400 cps	± 3000 cps	± 0.5 kc	± 3 db	Note D	600 ohms
104A	5-150	± 300 cps	± 1500 cps	± 1 kc	± 3 db	Note D	600 ohms
108B	15-500	± 550 cps	± 2900 cps	± 3 kc Note B	± 2 db Note C	135 ohms Note D	600 ohms
114A	100-800	± 550 cps	± 2900 cps	Note A	± 3 db	Note D	600 ohms

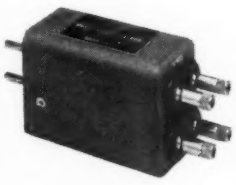
All Sierra Carrier Frequency Voltmeters feature built-in calibration oscillators and circuits for level calibration, have aural monitoring jacks, and (except 103B) are furnished with Sierra Model 149A Precision Spiral Scale Dials.

† Contains carrier re-insertion oscillator for monitoring suppressed carrier systems. Furnished with planetary drive dial. Note A. Ranges from ± 2 KC at low end of dial to ± 3 KC at upper end. Note B. ± 1 KC in the 48 KC to 256 KC region. Note C. ± 1 db for + 30 db to — 40 db attenuator steps on 135 ohm balanced measurements. Note D. All models may be converted for 135 and 600 ohm balanced line measurements by convenient plug-in bridging transformer, Model 130D.



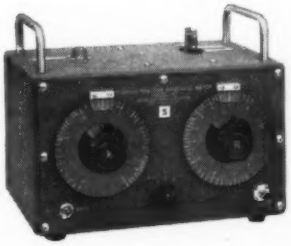
Sierra 101C Carrier Frequency Voltmeter

For carrier system and other field or laboratory work between 3 kc and 800 kc, Sierra offers 5 accurate, stable, tuned vacuum tube voltmeters. All are direct reading in voltage and dbm at 600 ohms from —80 dbm to +42 dbm.



Line Bridging Transformer

Model 130D Dual Impedance Line Bridging Transformer converts VTVM and wave analyzer inputs from single-ended to balanced operation. Covers 3 kc to 500 kc, bridges both 135 and 600 ohm balanced lines.



Impedance Meter, Line Fault Analyzer

Sierra 166 Impedance Meter (at left) measures impedance on high noise circuits, 30 kc to 300 kc; measures on "hot" lines through coupling capacitor.

Sierra 124 Line Fault Analyzer pinpoints shorts, opens or grounds on open wire lines. Direct reading, range ½ to 200 miles, accuracy ¼ mile.

Data subject to change without notice.

sierra

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today's

Highlights

of finance-taxes-business trends

by Willard F. Stanley

BUSINESS ACTIVITY—First National City Bank reports third quarter results of operations of about 800 corporations showed an 11 per cent increase for this quarter over last year and a 6 per cent increase in earnings of these companies for the nine months ended Sept. 30, 1957 as compared with the same 1956 period. So far, so good. But the favorable third quarter comparison is not as good as it looks for it reflects comparison with a particularly unfavorable third quarter in 1956, due to a combination of circumstances, including the steel strike, automobile inventory pile-up, etc. The third quarter of 1956 was, for these reasons, the worst of that year.

As to the future, some economists now presage a falling off in business activity and profits around the middle of 1958. In support of this prediction, backlogs continue to recede in many lines. Also car loadings for recent weeks have made an unfavorable seasonal comparison.

In addition, a recent survey by McGraw-Hill shows estimates of expenditures for plant expansion in 1958 about 7 per cent below the amount expected for 1957. All this adds up to considerable doubt whether the next 12 months will equal in business or profits the 12 months just elapsed.

* * * *

STOCKS STILL BREATHING HARD—After last month's report in this column, the stock market plunged further downward to a point more than 20 per cent below the Dec. 31, 1956 close, in terms of the New York Times average of 50 combined stocks.

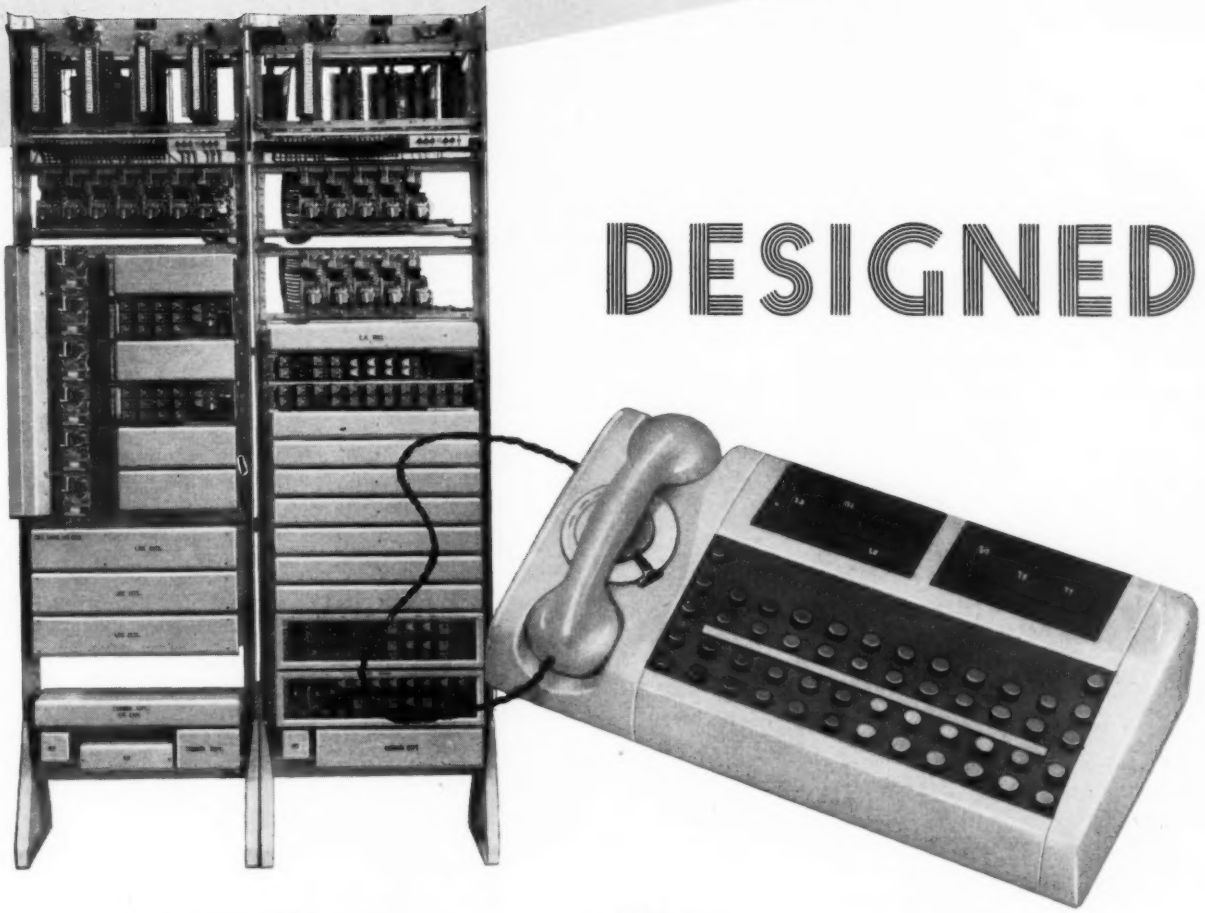
Then the market rallied modestly, only to fall back almost to the low for the last two years. It was revived, at least temporarily, by the cut in rediscount rate on Nov. 14, and at Nov. 19 reflected a decline of about 19 per cent from the Dec. 31 close. This compares with a similar decline of 17 per cent at Oct. 25, 1957 and 11 per cent at Sept. 20, 1957.

The general feeling that the business boom may be scratching its ceiling and that the road henceforth is likely to lead downhill, even though the incline may be slight, seems to write off the possibility of a strongly sustained market rally during the balance of this year. However, the rediscount rate reduction is a highly favorable development which should place yields on common stocks back where they belong; i. e. in advance of yields on good corporate bonds.

Movements in the near future may favor "income" rather than "growth" stocks. While we have probably been wrong on many individual items, we have long felt the "growth" stocks were selling entirely too high, and were discounting, as was said in 1929, not the "future," but the "millenium." Carefully selected investments in

(Please turn to page 44)

Mr. Stanley, formerly financial vice president of Southwestern Public Service Co., an electric utility with over 160 million dollars in assets, is president of Corporate Services, Inc. of New York City. He is a member of Controllers Institute of America and New York Society of Security Analysts. He serves on three committees of the Controllers Institute having to do with federal taxation, social security and finance management. His articles are appearing once a month in TELEPHONY.



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TYPE 30 DIAL PBX
AND ATTENDANT'S SET

for SUBSCRIBER SATISFACTION . . .

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UNITED STATES INSTRUMENT CORP.
P. O. Box 470T Charlottesville, Virginia

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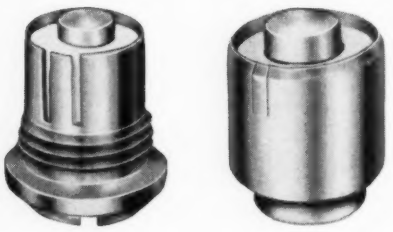
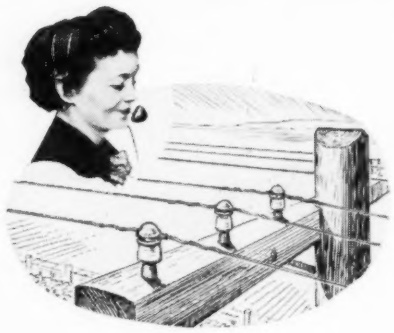


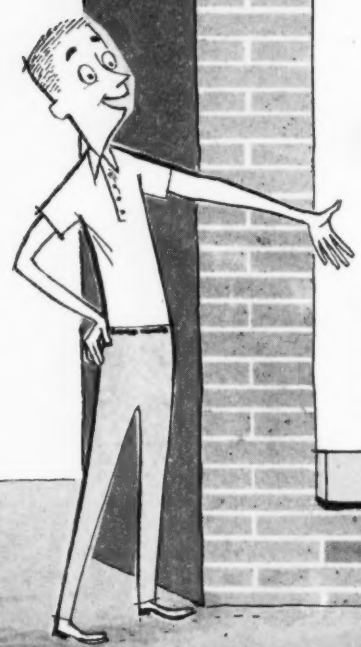
Protectors. The Cook Mytigap is a lightning arrester, surge and power-cross protector all in one, with self-restoring operation after functioning. The Cook Minigap is a high potential arrester for protection of communication lines. Ideal where the characteristics of carbon-to-carbon arresters are desirable. COOK ELECTRIC COMPANY.



Copperweld Talks Better than any other high-strength conductor. Strong, nonrusting, easy to string, it's unequalled for long-life, long-span construction. Use .080"—30 E.H.S. for short subscriber loops and secondary toll lines—and .104"—40 H.S. for toll lines and long subscriber loops.
COPPERWELD STEEL CO.

Model B Howler—For eliminating service calls due to misplaced receiver. Produces distinctive signal tone, demanding attention; loud, yet safe. Equipped with subscriber controlled relay for fully automatic operation. LORAIN PRODUCTS CORPORATION.

Preformed C Rural Dead-Ends for use on 2#14 and 2#12 Copperweld and 2—.083 Steel C Rural conductors. Made of stainless steel with neoprene coating. No slipping or damage to the conductor insulation. Multiple wire loop gives extra strength. Easy to apply by hand. Simply insert one leg through the eye-bolt and then wrap on the legs. PREFORMED LINE PRODUCTS COMPANY.



XUM

Seven Kellogg warehouses and over 100 Kellogg distribution points from coast to coast assure you savings in shipping costs and fast delivery. You get the benefit of Kellogg's selection of top quality line supplies, too.

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KELLOGG SWITCHBOARD AND SUPPLY COMPANY

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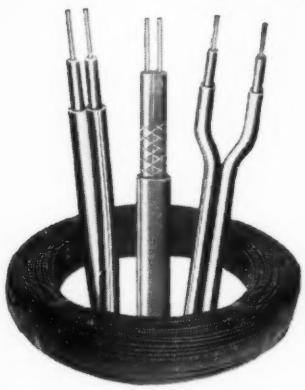
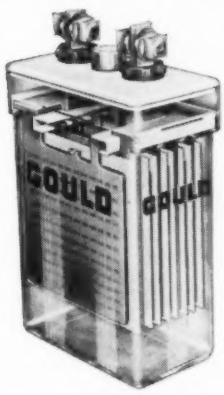
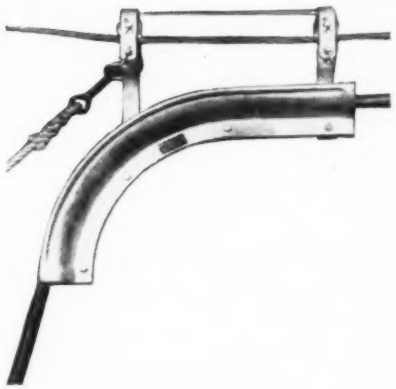


Long Service Life and Low Plant Costs go hand in hand with the installation of ENDURPRENE — The Neoprene Drop Wire available in both Copperweld and Bronze. This flexible and easy-to-handle wire is made by GENERAL INSULATED WIRE WORKS, INC.



Outstanding Battery Performance is yours when you choose Gould Planté Batteries. Thick, grooved, pure lead positive plates give many years of trouble-free service! Made by GOULD-NATIONAL BATTERIES, INC., the finest money can buy.

Fuseless Protector with weathertight neoprene cover. Equipped with Reliable No. 504 Protector Units for station protection and Reliable No. 506 Protector Units for cable protection. Listed under UL re-examination service. Easy to install—simple to maintain—extra-long life. Made by RELIABLE ELECTRIC COMPANY.



Cable Placing Shoe—used for guiding cable in raising the cable from the reel to the strand. Strong but light in weight—made of cast aluminum with steel arms and rollers. Locking pins keep shoe on strand. Made by CABLE SPINNING EQUIPMENT COMPANY.

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OXford 7-5780

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Dallas 7, Texas
Riverside 7-5191

1555 West Fourth Street
Mansfield, Ohio
LAfayette 4-6511

1594 Southland Circle, N.W.
Atlanta, Georgia
Sycamore 4-2441

165 Prospect Street
Passaic, New Jersey
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Chicago 29, Illinois
REliance 5-7740

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Minneapolis 16, Minnesota
WEst 9-6715-16

industrial and utility stocks whose earnings indicate the possibility of a reasonable return in dividends and whose prices are near the 1957 lows, still seem justified at present levels.

* * * *

INTEREST RATES ON THE IMPROVE—This heading is a bit premature, since it assumes that the Federal Reserve reduction in rediscount rates from 3 1/2 per cent to 3 per cent in New York and three other districts, will probably reduce the cost of long-term debt to new utility borrowers.

This move by Federal Reserve seems in realization of the fact that the "hard money" policy has not stopped inflation but only harassed borrowers and increased the cost of doing business, and hence contributed to higher prices to the public. However, the nominal reason given for the change is that inflation no longer seems a serious threat.

Of course, the creeping inflation representing a combination of business management and labor, with the higher labor costs passed on to the public in higher prices, still poses a problem for the American people, particularly the large segment thereof in a fixed income status. This trend was never affected by the cost of money and will not be affected by the lowering of the rediscount rate.

In addition to the favorable rediscount development, utility long-term borrowers may look for further relief from a lessening of expansion expenditures in 1958, if the McGraw-Hill estimate proves correct.

The Wall Street Journal tabulation of new funded debt utility issues showed at Nov. 14, that average bids on 16 new issues carried at a yield approximately 1 decimal (0.01 per cent per annum) below the average yield on these issues based on their original offering prices. The recent rediscount change has, however, made these statistics less meaningful than usual, as a brisk upturn in bond prices and consequent lowering of bond yields, both on existing and new securities, seems a reasonable result of the Federal Reserve decision.

There seems no justification for accelerating or deferring funded debt offerings, while common stock offerings continue to appear desirable to raise funds needed within the next year or so. Those companies which can act promptly should benefit from the temporary upsurge in bond prices which seems likely to follow the Federal Reserve pronouncement. Accordingly, where feasible, offering of pending deals should be made as soon as possible.

* * * *

ACCELERATED AMORTIZATION—News in recent months indicates Uncle Sam is likely soon to clamp down on the issuance of further Certificates of Necessity, granting accelerated amortization for defense projects for income tax purposes. Utilities having such projects in contemplation should apply for certificates promptly or they may "miss the bus."

Some utilities have refrained from claiming liberalized depreciation as to new property additions under the 1954 Revenue Act because of the work and complication of property accounts necessarily involved. Anticipated termination of further grants for accelerated amortization points up the advisability that such utilities claim liberalized depreciation, at least as to the uncertified portion of facilities as to which they hold Certificates of Necessity, where completion of the project will occur this year or thereafter.

This procedure would entail no additional work, since these items will have to be segregated for tax treatment because of the rapid write-off of the certified portion thereof.

The 1954 Revenue Act permits the selection by taxpayers of specific items in any property classification for purposes of liberalized depreciation, if such items are plainly identified in the tax return.

By following this procedure, utilities could obtain, in addition to the benefit of accelerated amortization, a further benefit from the interest-free use of the tax moneys saved by reason of claiming higher depreciation as to the uncertified portion of the additions—without any extra trouble or expense.

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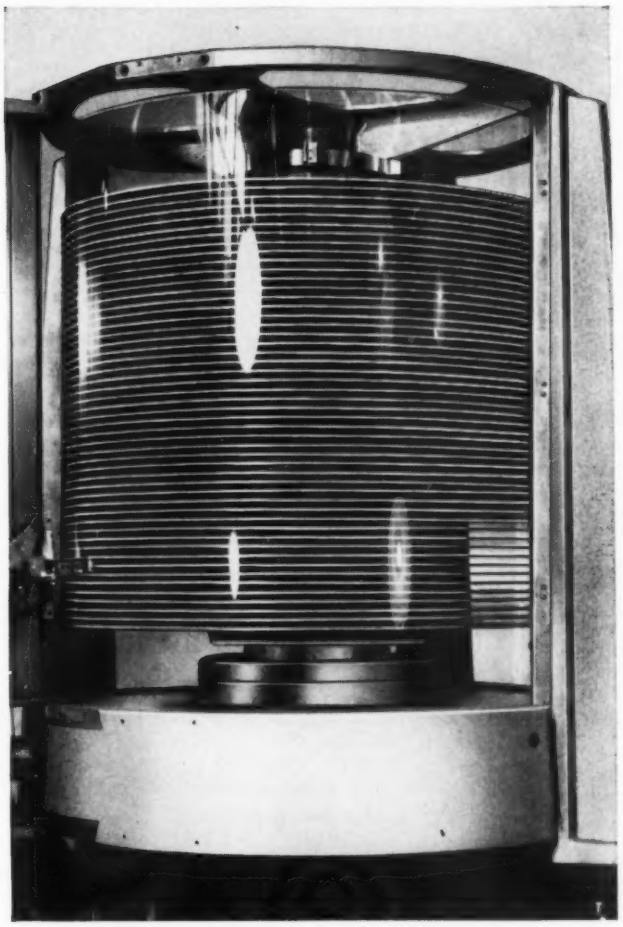

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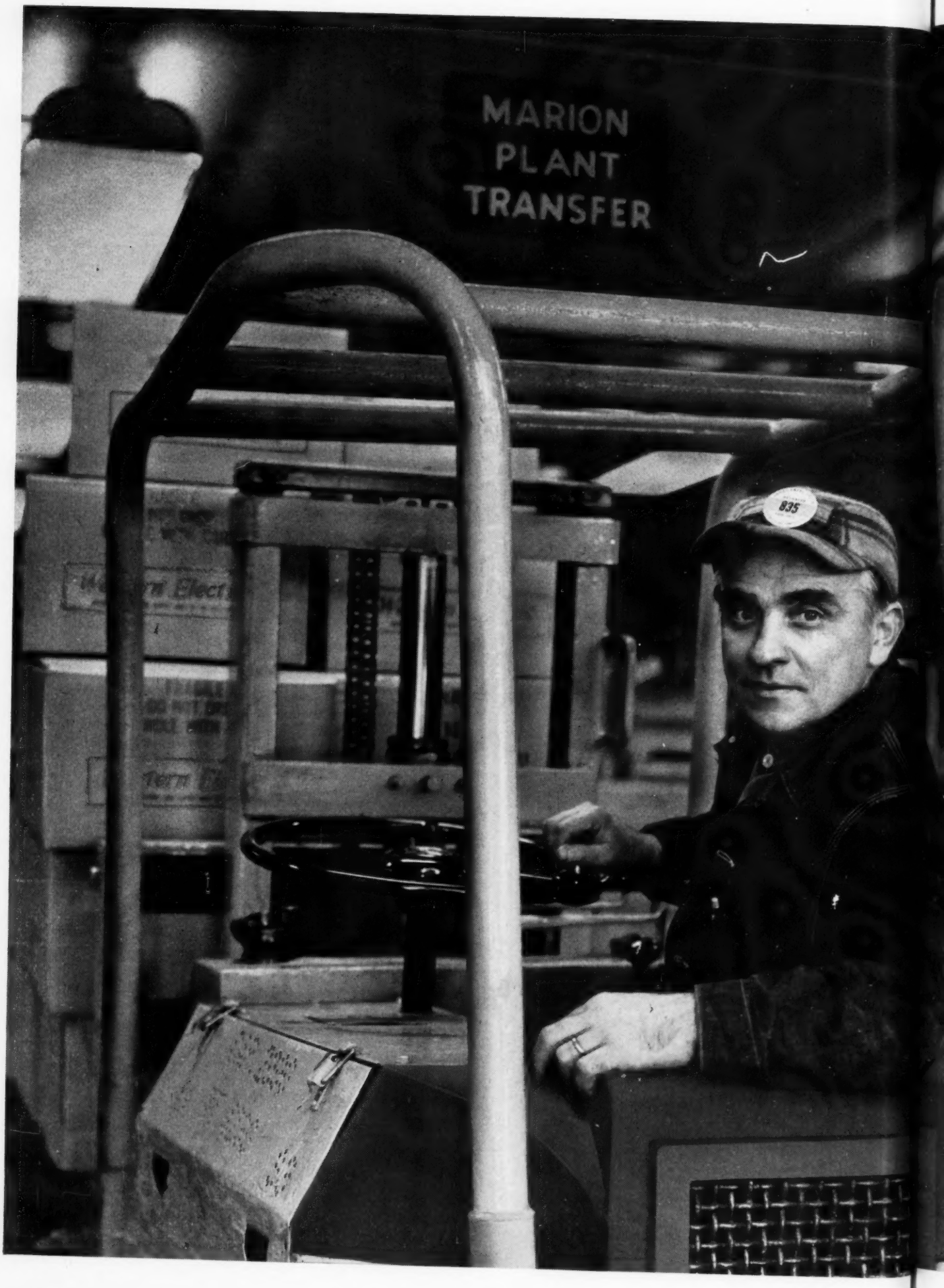
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PORTRAIT OF AN INDUSTRY

The Fork-Lift Operator

Hustling about plant and warehouse on his miniature truck, he ferries mountains of materials and products... getting the right things to the right place in time. Thus the fork-lift operator is an important link in the flow of telephone material from factory to subscriber.

Like the lineman and the telephone operator, the fork-lift operator lends his special skill and talents to help achieve the common goal of the telephone industry... providing better telephone service for America.

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

XUM

TELEPHONY'S Traffic Engineering Handbook

By Gilbert R. Brackett **Nov. 30, 1957**

Part 6 (Continued)
PBX Level "0"—Attendant Trunks

PBX operator trunks are one-way circuits used by dial stations to reach the attendant's switchboard. The number of trunks from the switches to the attendant should be determined from the trunk-group busy-hour 100 second calls which these trunks can be expected to carry.

If ten or less trunks are required, the level to which they are assigned should be multipled to all other selector multiple banks of the first selectors. If more than 10 trunks are required, it will be necessary to grade them.

To Determine "0" Level Trunk Requirements

Assume total load on the "0" level trunks to be 431 CCS

431 CCS ÷ 157 first selectors = 2.75 CCS per selector.

In the "Selector Multiple Table—10 Terminal Access—1 in 100," the closest figure to 2.75 in the 120 selector sub-group column, is 2.77. We read there that 19 trunks are necessary to carry the load of 2.75 CCS per selector.

But, one group of 120 first selectors leaves 37 of the 157 total not provided for.

37 first selectors × 2.75 CCS = 102 CCS.

There is no such low figure in the 120 sub-group column so we refer to the "Non-Graded Groups" table at the bottom of the table. There we find that the closest figure to 102 CCS is 105 CCS which calls for eight trunks.

And, so, the total "0" trunk requirements will be:

120 first selectors multiplied on 19 trunks.

37 first selectors multiplied on 8 trunks, or

157 first selectors multiplied on 27 trunks.

In other words, 27 trunks to the switchboard will be needed to carry the "0" level traffic.

PBX Level "9"—C. O. Trunks

Direct central office trunks are one-way from the PBX to the telephone company central office, generally provided from the ninth level of the first selectors so that calls may be dialed direct to the telephone company central office from unrestricted stations.

If 10 or less trunks are engineered, the level to which they are assigned should be multipled at the first selector banks, giving each selector access to each trunk.

If more than 10 trunks are called for, the trunks and selectors are arranged in sub-groups for that level and the sub-groups are built up by multiplying enough sub-groups together to provide a load for the trunks.

To Figure 9 Level C. O. Trunk Requirements Where More Than Ten Trunks Are Called For:

We shall assume 574 CCS will be delivered to the nine level C. O. trunks by 157 first selectors.

574 CCS ÷ 157 first selectors = 3.66 CCS per selector.

TRUNKS	SELECTORS PER SUBGROUP																TRUNKS
	320		240		160		120		80		60		40		20		
	CCS CAPACITY PER																
	SEL	GRP	SEL	GRP	SEL	GRP	SEL	GRP	SEL	GRP	SEL	GRP	SEL	GRP	SEL	GRP	
10	.47	149	.63	150	.95	152	1.28	154	1.95	156	2.63	158	4.10	164	9.10	182	10
11	.52	168	.71	170	1.08	172	1.45	174	2.20	176	3.00	180	4.65	186	10.50	210	11
12	.59	188	.79	190	1.20	192	1.62	194	2.47	198	3.37	202	5.25	210	11.90	238	12
13	.65	208	.87	210	1.33	212	1.78	214	2.73	218	3.73	224	5.85	234	13.20	264	13
14	.71	228	.96	230	1.45	232	1.95	234	2.98	238	4.10	246	6.45	258	14.50	290	14
15	.77	246	1.03	248	1.56	250	2.12	254	3.23	258	4.35	266	7.00	280	15.80	316	15
16	.82	264	1.11	266	1.68	268	2.27	272	3.48	278	4.77	286	7.60	304	17.10	342	16
17	.88	282	1.18	284	1.80	288	2.45	292	3.73	298	5.15	308	8.20	328	18.20	364	17
18	.94	300	1.26	304	1.91	306	2.60	312	3.98	318	5.50	330	8.80	352	19.20	384	18
19	.99	318	1.34	322	2.05	328	2.77	332	4.25	340	5.90	354	9.45	378	20.20	404	19
20	1.05	336	1.43	342	2.15	344	2.93	352	4.50	360	6.27	376	10.10	404	-	-	20
21	1.11	354	1.50	360	2.27	364	3.08	370	4.77	382	6.63	398	10.75	430	-	-	21
23	1.22	390	1.65	396	2.51	402	3.42	410	5.32	426	7.60	444	12.20	480	-	-	23
25	1.33	426	1.80	432	2.74	438	3.75	450	5.88	470	8.17	490	13.25	530	-	-	25
27	1.44	462	1.95	468	2.96	474	4.08	490	6.44	515	9.00	540	-	-	-	-	27
29	1.56	498	2.10	505	3.19	510	4.42	530	7.00	560	9.92	595	-	-	-	-	29
31	1.67	535	2.27	545	3.44	550	4.75	570	7.56	605	10.75	645	-	-	-	-	31
33	1.78	570	2.44	585	3.69	590	5.13	615	8.12	650	11.58	695	-	-	-	-	33
35	1.89	605	2.58	620	3.94	630	5.46	655	8.69	695	12.42	745	-	-	-	-	35
37	2.02	645	2.73	655	4.22	675	5.79	695	9.31	745	-	-	-	-	-	-	37
39	2.14	685	2.90	695	4.47	715	6.17	740	10.00	800	-	-	-	-	-	-	39
41	2.25	720	3.04	730	4.72	755	6.54	785	10.63	850	-	-	-	-	-	-	41
43	2.36	755	3.19	765	4.97	795	6.87	825	11.25	900	-	-	-	-	-	-	43
45	2.48	795	3.35	805	5.25	840	7.25	870	11.87	950	-	-	-	-	-	-	45
	320		240		160		120		80		60		40		20		

NON-GRADED GROUPS

TRUNKS	1	2	3	4	5	6	7	8	9
CCS CAPACITY	.4	5.4	16	30	46	64	84	105	126

Slector Multiple Table—10 Terminal Access—1 in 100

In the "Selector Multiple Table—10 Terminal Access—1 in 100," 120 sub-group column, a CCS of 3.66 calls for 25 trunks. A sub-group of 120 first selectors on 25 trunks leaves 37 first selectors not provided for.

37 first selectors × 3.66 CCS = 135 CCS.

Again, refer to the table. There we find the closest figure to 135 CCS is 154, which calls for 10 trunks.

Therefore, the ninth level trunk requirements will be

120 first selectors multipled on 25 trunks

37 first selectors multipled on 10 trunks, or

157 first selectors multipled on 35 trunks.

Another Method Which May Be Used

Again, we shall assume 574 CCS ÷ 157 first selectors = 3.66 CCS per selector, which calls for 25 trunks, leaving 37 selectors not provided for.

37 first selectors × 3.66 CCS = 135 CCS.

Now, add this 135 CCS for the 37 first selectors to the group figure for 3.66 CCS, 120 sub-group column.

450 CCS + 135 CCS = 585 CCS.

The closest figure to the 585 CCS total (in the table, 120 sub-group column) is 615 which calls for 33 trunks, two trunks less than the other method.

NOTE: This latter method of engineering trunks for the ninth level may be used where the number of trunks involved in the partial group is less than half the total number in the group.

(Section 6 to be continued next week)

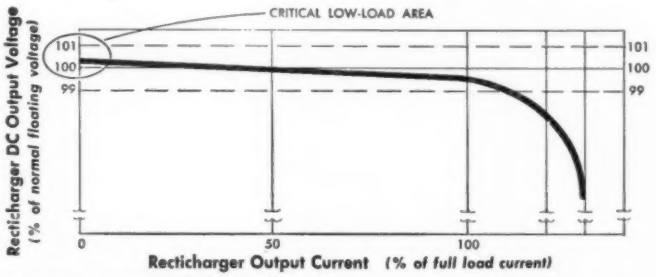
Restful hours for you—

BUT NOT FOR YOUR BATTERIES

Midnight to 6 A.M.—hours that may be stealing *years* from the life of your batteries. During these low-load periods, the output of your battery chargers may crawl up, overcharging batteries, causing gassing, sharply reducing battery life.

Not so—definitely not—with new, vastly improved Raytheon Recticharger® battery chargers. These battery chargers provide constant voltage within ±1% from full load right *down to no load.* They hold the mark even with input voltage variations of ±10%. Result—far less battery maintenance; far greater battery life.

New Rectichargers have a host of other advantages; find out more about them by writing Dept. 6120.



VOLTAGE CURVE IS FLAT from no load to full load with the Recticharger. Note automatic current limiting for overload protection.

NEW 48 VOLT RECTICHARGERS

- No audible hum
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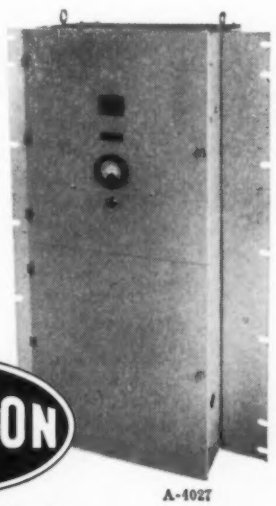
- Models for 3 to 400 amperes



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by Ralph W. Pouk, Jr., Office Mgr. and Inside Sales—Chicago

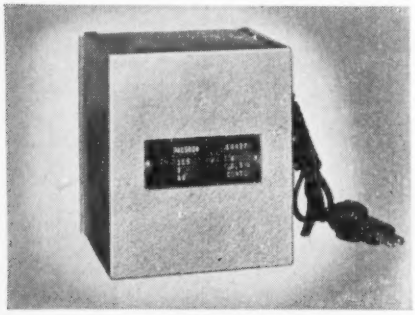
Back when I was a journalism student, I learned the most important news is always—WHO. The same is true in your business. When it comes to ordering supplies, names are the important part of the story. Behind the products you order stand the maker's name—**and** Stromberg-Carlson's name for 62 years of the finest in the field of sound. Together, these names protect you with a double guarantee on performance. They tell you you'll be satisfied with equipment you order. And of course, each order of yours is a boost for the science of telephony—because your supply business plays a major part in helping us continue our research for new and better telephone equipment. We're mighty grateful for your support. We'll do our best to merit your friendship in years to come.

Battery eliminator gives you DC, even if your AC source fails!

If you want 24-hour guaranteed direct current, you can get it with the Schauer Battery Eliminator.

This unit gives you the assurance and security that, no matter what might temporarily interrupt your alternating current source, you will still get a steady flow of direct current.

This battery eliminator, the PA-05004 type illustrated, is designed specifically for use on the operator's circuit on magnet switchboards.



Schauer Battery Eliminator has built-in Power-off Relay.

When operating from 110-volt, 60-cycle lighting circuit, it delivers a constant, humless direct current. If the alternating current supply fails, a built-in Power-off Relay automatically transfers the operator's circuit to stand-by dry cells.

Other models available for Lamp Signal (PBX) and Automatic (PAX) systems. Products of Rectifier Division, Schauer Manufacturing Corp.

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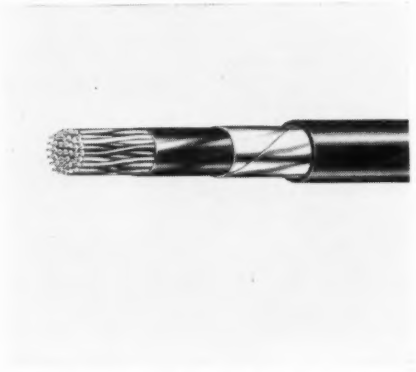
Economical 775-P-SS Self-Supporting Telephone Cable

Low Cost SS Cable With Dependable, Long Life



Available in 6, 11, 16 and 26 pair

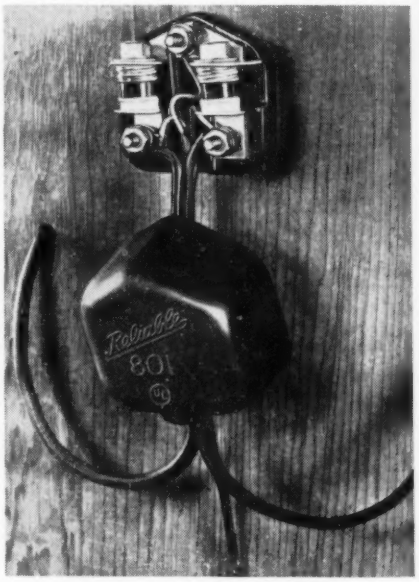
This Ansonia Wire & Cable Company product offers finer electrical characteristics than any other comparable cable.

In outside plant construction you can eliminate messenger and associated hardware by using light, flexible Ankoseal Type 775-P Self-Supporting Cable.

Its 19 gauge medium-hard copper conductors are individually insulated and paired with systematically varying lays to eliminate crosstalk. Aluminum tape sheathing and plasticized jacket provide excellent protection against weather.

Long life under all conditions

You get long service life under all kinds of weather conditions with the Series 800 Fuseless Protector, recently developed by Reliable Electric Company.



Easy to install and maintain

This new protector is available with Reliable No. 504 Protector Units (as No. 801) for station protection and with Reliable No. 506 Protector Units (as No. 801A) for cable protection.

The weather-tight neoprene cover has passed the Underwriters Laboratories severe requirements for performance and weathering under temperature extremes. The protector is listed under UL Re-examination Service.

The neoprene cover fits snugly and drops out of the way conveniently when protector is installed or serviced.

Your Stromberg-Carlson representative can offer prompt delivery on your order.

Reserve lead keeps battery young

Inside the unique lead buttons in an Exide-Manchex positive plate there's a coil of reserve lead designed to prolong battery life. Over the years, as this lead is needed, it goes into action, instantly and automatically.

The unique thing about Exide-Manchex construction is that the reserve lead does not have to support the plate. The spiral lead buttons are tightly locked into a cast lead-antimony alloy grid several times more rigid than pure lead. Hence the reserve lead can be completely consumed while the plate retains its strength.

Only Exide-Manchex Batteries have this construction. In addition, they feature a plastic jar that saves weight and space, high level electrolyte for less frequent filling, and huge bottom reservoir that virtually insures against sediment shorts.

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Plant Man's QUIZ

By RAY BLAIN, Technical Editorial Director

Q. We'd like to know whether in general, it will prove more economical for the average operating telephone company to lease rather than own its motor vehicles?

A. Perhaps this will depend primarily on local conditions and the leasing arrangements which may be entered into in your particular locality.

As a rule, however, it is usually found that the special types of vehicles necessary for telephone work are not readily available on a lease basis. Whenever these special vehicles are available, the cost of leasing generally proves prohibitive.

The leasing of passenger cars from a cost standpoint usually proves undesirable as the average telephone company can ordinarily purchase and maintain its own at a lower cost.

Both passenger cars and trucks are generally rented by telephone companies when they are required to meet temporary and emergency conditions.

•

Q. Will it be possible to make use of recorded announcements to reduce the work of dial assistance operators, and is this type of equipment difficult to maintain?

A. Yes, there are many ways in which the recorder-announcer may be used to advantage for this purpose.

For example, calls to dead, unassigned and disconnected numbers, and other calls of this nature, no longer require operator handling. The announcer will give as many as five messages at once to callers with five different "problems." About the only calls which need to be referred to an operator are those to changed telephone numbers.

To record or change messages on the recorder-announcer, you simply set patching cords and switches for the proper channel, erase, and speak the explanatory message you want into the microphone.

Then set the announcer to run continuously or on a start-stop basis. Callers will then receive the information they require. This equipment is simple to install and maintain.

•

Q. Will you review for us the various factors to be considered in deciding whether cable distribution in a new housing development should be aerial or underground?

A. Down through the years, aerial cable distribution has been used in residential areas as it has proved more economical. However, in recent years certain developments have caused many operating companies to give serious consideration to underground cable distribution in certain residential areas.

Various factors have contributed to this change in thinking such as better and uninterrupted service, appearance, and in many cases, lower cost when the maintenance over a term of years is considered.

In the old days, houses were usually constructed on large lots and only a few lines were required to serve each area. Then, too, a large percentage of these houses were of the two-story variety, or, if only one-story, were of the high ridge pole design. With the old style house and aerial cable distribution, the drop wire attachment could usually be made at a point high enough to give good street and alley clearance.

In recent years, with the construction of mass housing developments, lots are smaller and the telephone requirements are more concentrated. The one-story ranch-type house, so popular at the present time, presents a real problem in obtaining proper drop wire clearance over streets.

Proper use of plastic-type buried cable, pedestal-mounted terminals, and improved construction tools and methods, have so reduced cost of underground distribution cable that it may often prove to be more economical than aerial cable distribution in certain residential developments.

Each case must be considered on its own merits, however, and a decision reached as to which type of construction will prove most advantageous and economical.

In Michigan Bell Telephone Co.'s showroom advice is offered on matching telephone colors to decor of home or office.

Michigan Bell Opens Telephone Showroom

THE FIRST telephone "store" in the Bell System is open for business. Referred to as the "Telephone Showroom," the shop was established by the Michigan Bell Telephone Co. in a shopping center near Detroit as a public showplace for its newest lines of color instruments and auxiliary services.

Consultation service is available to telephone customers who seek advice on matching telephone colors to decor of homes or offices. Attendants also offer explanations and demonstrations of new switchboards, telephones for the hard-of-hearing, the automatic secretary (Amanda), the Speakerphone ("no hands" telephone), telephone wall plugs, dial-light telephones, and other special items.

The showroom does not handle regular business office functions such as collecting bills or processing orders for service, although the staff is trained to assist in those matters upon request.

LEFT: Showroom attendant points out advantages of planning telephone arrangement within homes. CENTER: Another attendant notes customer preference for a colored telephone. RIGHT: Use of Speakerphone ("no hands" telephone) is explained to prospective customer.

Florida Telephone Corp. Sells $2,000,000 Bonds

Florida Telephone Corp. has sold 2 million dollars of 25-year first mortgage bonds at 5½ per cent to institutional investors, it was announced on Nov. 7.

Aetna Life Insurance Co. purchased one million dollars of the issue and Mutual of New York and Phoenix Mutual Life Insurance Co. each took half a million.

Florida Telephone, with headquarters in Ocala, serves eight counties in Central Florida with a population of about 150,000. The company will use the proceeds for construction.

AT&T Plans $720 Million Debenture Issue

The American Telephone & Telegraph Co. announced on Nov. 20 that a special meeting of its stockholders will be held on Jan. 15, 1958 to authorize offerings of additional securities to its stockholders and to employes. The proceeds of the issues will be used to meet the demand for new telephone facilities.

The meeting will be asked to authorize an issue of convertible debentures of approximately 720 million dollars. If the issue is approved, each stockholder will receive "rights" to purchase debentures at their face amount in proportion to his holdings of stock—on the basis of $100 principal amount of debentures for each nine shares held. It is expected that "rights" to purchase will be mailed to stockholders on or about Feb. 7, 1958 and that the subscription period during which the "rights" may be exercised will run until about Mar. 12, 1958. The terms of the issue, including the conversion price at which the debentures will be convertible into stock of the company, will be fixed by the directors shortly before the "rights" are issued. The Chase Manhattan Bank will act as trustee of the issue.

The same meeting will also be asked to authorize an employes' stock plan under which the company can make offerings of up to 7 million shares of its stock to employes of the company and its subsidiaries at such times as the directors may determine. It is expected that sales under the proposed plan will take place over the next five years.

It has long been the policy of the company to raise a large portion of the money needed to finance its construction requirements through offerings of securities to its stockholders and also to employes.

INVESTIGATE

The Unique Kellogg Volunteer-Fire-Call System

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- **Works with any type of equipment.**
- **Automatically rings up to 10 firemen from originating call.**
- **Identifying . . . continuous ring.**
- **Provides emergency warning tone on busy lines.**
- **Optional—"Meet-Me" conference circuit.**
- **Optional—Day-Night switching circuit.**
- **Proved reliable through years of continuous service.**
- **Easy universal wall mounting. Compact size 40″ x 18″ x 10¼″.**

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Courts and Commissions

Kentucky Co-Op Purchases Two Independents

Daniel B. Corman, general manager, South Central Rural Telephone Cooperative Corp., Glasgow, Ky., has announced the acquisition of the Farmers Mutual Tel. Co. of Buffalo, Ky., and the Magnolia (Ky.) Tel. Co.

The Buffalo exchange serves approximately 130 subscribers, and the Magnolia exchange, approximately 85 subscribers, with magneto type telephones. Mr. Corman states that both exchanges will be converted to unattended dial operation about December 1958 and that it is expected approximately 700 subscribers will take the new service.

The purchase of these properties by Mr. Corman has been approved by the Kentucky Public Service Commission.

N. C. Independent Asks to Issue 10,000 Shares Stock

The Pinebluff Telephone Co. asked the North Carolina Utilities Commission on Nov. 19 for permission to issue an additional block of capital stock in an amount not to exceed 10,000 shares.

The company proposes to issue 100 additional shares of its capital stock at par value of $100 to pay obligations and expenses incurred in connection with the change from its old switchboard system to dial operation, which is scheduled to become effective Dec. 1.

The company also stated that it needs to raise money for working capital and for fully complying with equity requirements of the Rural Electrification Administration in connection with its loans of $132,000 and $29,000 to the company.

Illinois Independents Ask Financing, Purchase

The Illinois Commerce Commission recently extended to the National Trail Telephone Co. authority to issue $200,000 first mortgage notes payable to Stromberg-Carlson Co. at 5½ per cent interest, due in 240 consecutive equal monthly installments; also to issue 2,000 shares of no par common stock at the stated value of $5.00 per share. The money is to be used to acquire property or for construction, extension or improvement of facilities.

The Midland Telephone Co. on Nov. 29 was to have a hearing on its petition to purchase the plant and facilities of the Bunker Hill Mutual Telephone Co. at Woodburn and vicinity.

Minnesota Company Gains Increase in Rates

The Minnesota Railroad & Warehouse Commission on Nov. 18 authorized the Deuel Telephone Co-operative Association to raise rates at its Lake Benton exchange, upon completion of rehabilitation of outside plant and automatic central office equipment in 1958.

Net operating revenues for the Lake Benton exchange then are expected to rise from $18,542 to $36,342, while net income will rise from $3,659 to $9,769, giving a return of 3.41 per cent on a $286,195 rate base. The company presently serves 407 subscribers. The Deuel co-op has recently been granted a loan allocation by the REA in the amount of $886,000, of which sum $271,986 will be used to rehabilitate its Lake Benton exchange.

The following present gross rates and approved net rates are:

One-party business	$4.25	$7.00
Two-party business	3.75	6.25
Rural multi-party business	3.25	6.00
One-party residence	2.75	4.50
Two-party residence	—	4.00
Four-party residence	2.25	3.50
Rural Multi-party residence	2.75	4.00

SW States Lists 160,000 Shares Preferred With SEC

Southwestern States Telephone Co., Brownwood, Tex., entered a registration statement for 160,000 shares of $25 par cumulative convertible preferred stock with the Securities & Exchange Commission, it was reported on Nov. 21.

The company said the shares would be offered publicly through a group managed by Dean Witter & Co. Proceeds would be used to help finance a Southwestern States' construction program and repay about one million dollars in bank loans.

N. Y. Company Asks to Sell

The joint petition of Farmers Union Telephone Co. to sell its system and of Chenango & Unadilla Telephone

Corp., Norwich, to buy, was to have been heard on Nov. 14 by the New York Public Service Commission.

Illinois Commission OKs Raises, Financing, Sale

The Illinois Commerce Commission on Nov. 20 authorized the General Telephone Co. of Illinois to acquire all of the outstanding stock of the Jerseyville Telephone Co. (TELEPHONY, Oct. 12, p. 37).

The stock is now held by the General Telephone Corp., which owns all of the common stock of the General Telephone Co. of Illinois. The Jerseyville company will be dissolved.

In other orders, the commission:

Suspended and set for hearing Dec. 4 the application of the Mulberry Grove Telephone Co. for a $5,000 annual rate increase.

Authorized General Telephone Co. of Illinois to place in effect the appropriate schedule of rates for dial service when its exchanges at Macomb, Meredosia and Greenview are converted to automatic operation in December.

Authorized the Bath Telephone Co. to issue stock and notes to raise $39,500 which will be used to convert its Kilbourne exchange to automatic.

Kansas Company Requests Increase in Rates

The Kansas Corporation Commission on Nov. 13 set Feb. 3 as the date to hear an application by United Telephone Co. of Kansas, Inc., Abilene, to increase its rates by $296,130 a year.

The raise would affect 33,000 customers in United's 58 exchanges.

The company has told the commission that it plans to spend about 5 million dollars before 1961 in improving its system.

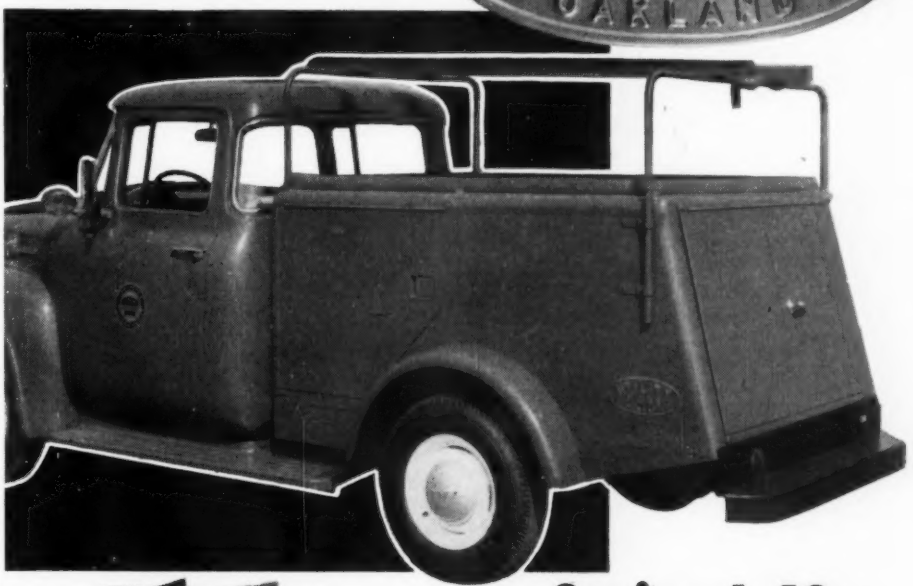
Carolina T&T Posts Bond To Effect Rate Raise

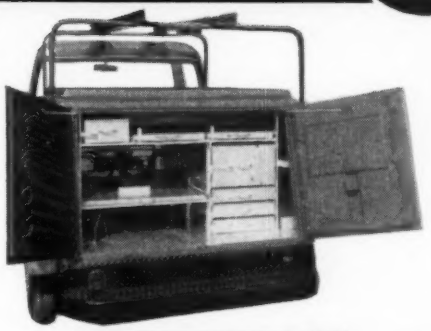
The Carolina Telephone & Telegraph Co., Tarboro, will be required by the North Carolina Utilities Commission to post a bond of $750,000 pending approval of a rate increase which it will put into effect on Nov. 25, it was announced on Nov. 20 by John F. Havens, vice president of the company (TELEPHONY, Nov. 9, p. 41).

The company announced sometime ago that it was taking advantage of a seldom-used state statute which permits utilities to increase their rates before a hearing is held by the commission to insure refunds in case the full amount of the increase is not allowed.

Carolina T&T's proposed increase

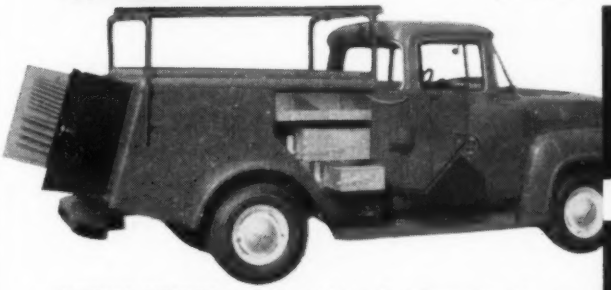
SERVICE BODIES by UTILITY BODY OAKLAND

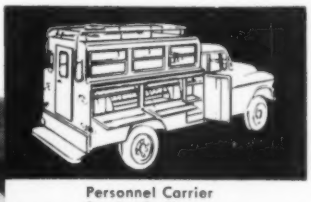




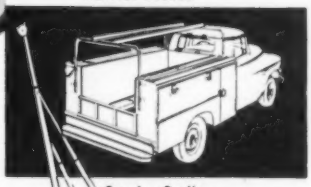
Series I-40
INSTALLERS BODY

Special Truck Body developed for telephone installation and service work. Provides maximum storage space for necessary parts and materials, readily accessible, easily inventoried. An advance design incorporating all the latest features—easily adapted to varied urban and rural service problems.

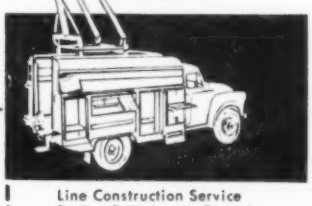




Personnel Carrier Service Bodies



Service Bodies



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And it's Klein again with a new, high leverage cutting plier for light- or heavy-gauge wire, including No. 2 weatherproof hard drawn solid copper wire, and A.C.S.R.

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Regular pattern available

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will total around 1½ million dollars a year and Havens said, "We have got to have sufficient revenue in order to provide a return on our stock that will attract outside capital for growth."

The commission plans a hearing on Dec. 17 on the proposal, but by posting the bond the company proceeded with plans to put the increase into effect with the billings of Nov. 25.

Power, Kappel Cited in 50 Foremost Business Leaders

Forbes Magazine, following a nationwide survey, recently selected Donald C. Power, president of General Telephone Corp., and immediate past president of the USITA, and Frederick R. Kappel, president of the American Telephone & Telegraph Co., among "today's 50 foremost business leaders."

Both men were among the honored guests at *Forbes'* 40th anniversary banquet held on Nov. 6 in New York in the Waldorf Astoria's Grand Ballroom.

Neb. Company Incorporates

The Glenwood Telephone Membership Corp., Blue Hill, on Nov. 14 incorporated with the Nebraska Secretary of State as a non-profit organization.

Wis. Company Asks Raise

The Weyauwega (Wis.) Telephone Co. was scheduled to have a hearing before the Wisconsin Public Service Commission Nov. 25 on its application for authority to increase rates.

Enters Rate Plea in Oregon

An application for increased rates entered by the Monroe Telephone Co. on Nov. 21 was ordered suspended by the Oregon Public Utility Commissioner for a period not to exceed six months from Dec. 1.

Alabamians, Mississippians Convene in Birmingham

The joint convention of the Alabama-Mississippi Independent Telephone Association was held on Nov. 11 and 12 in Birmingham, Ala.

Earl McDonald of Ackerman, Miss., presided as R. A. Lumpkin of Mattoon, Ill., described "What the USITA Means to the Small Telephone Company."

A round table discussion of methods of cooperation among small telephone companies was held. The procedure: 15 to 20 minutes of subject development by a speaker, and then a question-and-answer period. Subjects and their respective speakers were:

"Possible Types of Organizations by Which This Could Be Accomplished," by Ralston Robertson of Bayou Labatre, Ala.

"Combined Supply Purchasing," by W. F. Corman of Atmore, Ala.

"Equipment and Manpower Pools," by Fred Thomas of Eclectic, Ala.

"Group Types of Insurance," by Frank Dutton of Atlanta, Ga.

"Combined Billing and Accounting," by Mr. McDonald.

J. G. Bradbury, executive vice president of Southern Bell Telephone & Telegraph Co., presented a talk titled, "The Job Ahead." The concluding talk, "Small Company Development," was made by Everett C. Weitzell, chief, telephone operating and loans division, REA, Washington, D. C.

1958 Convention Calendar

Association	*Date*	*City*	*Hotel*
Louisiana	Feb. 12 and 13	New Orleans	Jung
Minnesota	Feb. 17, 18 and 19	St. Paul	St. Paul
Texas	March 3 and 4	Dallas	Baker
Kentucky	March 4	Lexington	Phoenix
Iowa	April 8 and 9	Des Moines	Fort Des Moines
Ohio	April 14, 15 and 16	Columbus	Deshler-Hilton
Nebraska	April 22 and 23	Omaha	Paxton
Indiana	May 7 and 8	Indianapolis	Claypool
Wisconsin	May 14 and 15	(City and hotel unannounced)	
Illinois	May 21 and 22	Peoria	Pere Marquette
Kansas-Missouri*	May 26 and 27	Kansas City	Town House
Pennsylvania	May 26, 27 and 28	Bedford	Bedford Springs
Maine-New Hampshire-Vermont*	June 3, 4 and 5	Rockland, Maine	Samoset
California	June 4, 5 and 6	San Francisco	Sheraton-Palace
New York	June 16, 17 and 18	Schroon Lake	Scaroon Manor
Michigan	Sept. 9, 10 and 11	Grand Rapids	Pantlind
USITA Annual convention)	Oct. 13, 14 and 15	Chicago	Conrad Hilton
Virginia	Oct. 30 and 31	Roanoke	Roanoke

*Joint Convention

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On the surface, many ground rods look good. But in *service*, there's a big, better difference to Hubbard Copperweld. By an exclusive, molten-welding process, a thick, uniform layer of pure copper is fused to an alloy steel core. Instantly, the two metals become as one, with the desirable qualities of each inseparably joined. As a result, Hubbard Copperweld Sectional Ground Rods have the *permanent* rust resistance and conductance of solid copper, plus the strength and easy driving qualities of steel.

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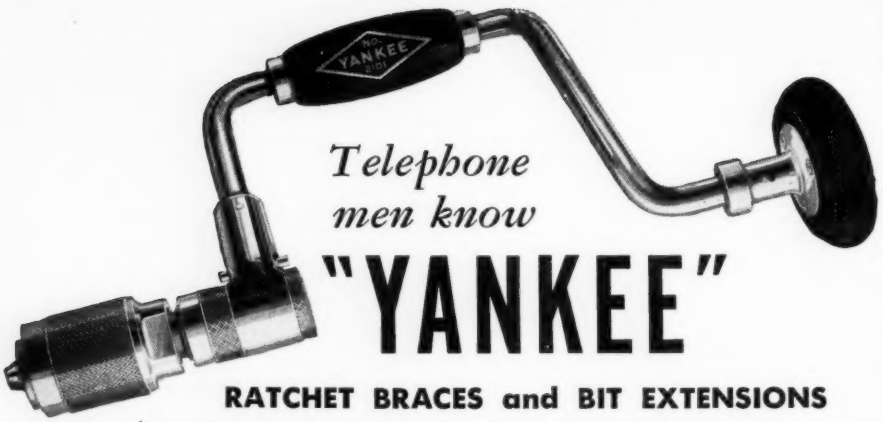


Telephone men know

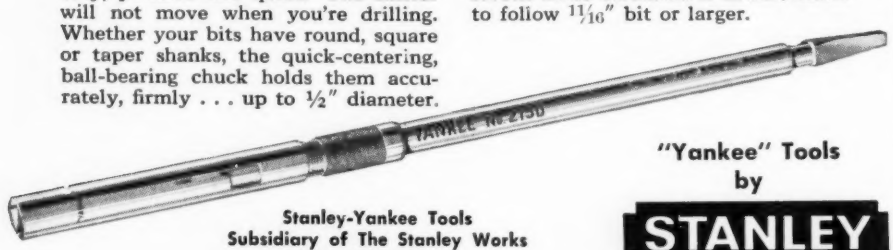
"YANKEE"

RATCHET BRACES and BIT EXTENSIONS

"Yankee" Ratchet Braces and Bit Extensions are old telephone company friends. Maintenance and installation men know from years of using them the sturdy stuff they're made of, the fine way they're made and how much these tools ease up a job.

The No. 2101 Brace was made with an installer time ticket in mind. It has the famous "Yankee" Ratchet that's easy, positive and quiet. The shifter will not move when you're drilling. Whether your bits have round, square or taper shanks, the quick-centering, ball-bearing chuck holds them accurately, firmly . . . up to ½" diameter. You bore true and fast because the patented sweep handle cancels out excessive play or binding. Practically unbreakable hard rubber handles.

The No. 2150 Bit Extension holds square shanks firmly in an inner socket. Chuck is constructed to accommodate all types of square shanks securely and without jamming. Taper end of shank is accurately machined. Bit cannot loosen while extension is in use. Made to follow $11/16$" bit or larger.



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Written by a leading educator in an easy to read style, and beautifully illustrated with authentic photographs.

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"LET'S MAKE A TELEPHONE CALL" is currently being utilized by Telephone Companies throughout the country as a Customer Relations tool, for use in Employment Procurement Programs as well as inclusion in the Teletrainer and Telezonia kits.

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Telephony's Representative Receives High Honor

McDonald-Thompson of San Francisco, Cal., TELEPHONY's representative on the West Coast, Colorado, Texas and Oklahoma has been awarded the "1957 Space Buyers Grand Trophy" of The Advertising Agency Register, Los Angeles, for performing the greatest service to the magazines it represents and to advertising agencies on the West Coast.

The Advertising Agency Register, in September and October, conducted a special confidential poll among all Pacific Coast advertising agency space buyers, as to the performance of magazine advertising representatives in respect to the following qualifications:

(1) Does your nomination contact you regularly?
(2) Is he fully informed on his publications?
(3) Provide service and marketing information?
(4) Maintain good appearance always?
(5) Respect your busy schedule?
(6) Respect his competitors?
(7) Is presentation orderly and informative?
(8) Know his subject matter thoroughly?
(9) Provide sound, constructive ideas?
(10) Always on time for appointments?

McDonald-Thompson placed first in the poll and received The Advertising Agency Register's trophy at a recent meeting of the Hollywood Ad Club. It was presented by James Speer, president of the Western States Advertising Agencies Association.

TELEPHONY salutes the personnel of its West Coast representative and congratulates them on receiving this high honor. We are proud to be associated with such an outstanding organization.

"Never remember to have them taken out before we move on."

Piedmont Wood Preserving Adds Two to Sales Staff

The Piedmont Wood Preserving Co. on Nov. 20 announced the addition of W. T. Armstrong and Charles G. Gehring to its sales staff.

Mr. Armstrong was appointed eastern sales representative and will cover the state of New York, including New York City, and the New England States. His headquarters will be Post Office Box 106, Bergenfield, N. J. He has had approximately 13 years experience in the wood preserving industry, the first 10 in the operating field and the last three in sales. Mr. Armstrong was formerly with the American Creosoting Corp.

Mr. Gehring will be sales representative for the Middle Atlantic States, and in that capacity will cover New Jersey, Pennsylvania, West Virginia and Ohio. For the present, his headquarters will be Post Office Box 145, Middlebush, N. J. In 1958 he will move to mid-Pennsylvania to be more centrally located in his sales territory. Mr. Gehring has had approximately seven years experience in the wood preserving industry, all in sales. He also was formerly with American Creosoting Corp.

"Can" White in Hospital

T White, well known president of verstick Anchor Co., Fairfield, Ia., is recuperating from a heart attack which he suffered during the October convention of the United States Independent Telephone Association. He is confined to the Jefferson County Hospital in Fairfield.

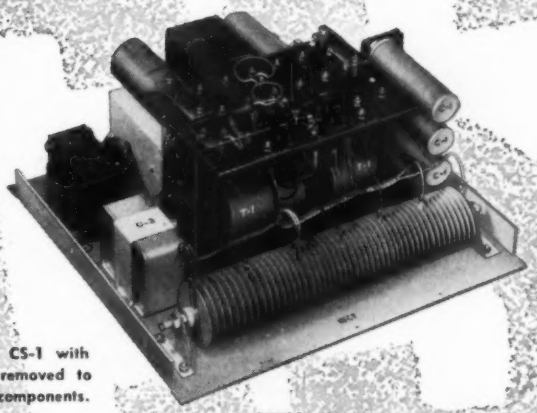
Atomic Energy Development

"The choice is whether the peaceful uses of atomic energy are to be developed in the framework of the competitive economic system—and thus benefit from the rapid expansion and cost-cutting incentives such as have characterized the iron and steel industry—or whether the atomic energy industry is to lapse back into the embrace of government, with all that is entailed in so doing. . . . Government and industry must work hand in hand in developing the atom's peaceful uses, including govment assistance through research and experimental development for the benefit of all industry. . . . The question is not whether the government is to play a rôle, but how dominant a rôle and by what methods. . . ." — LEWIS J. STRAUSS, *chairman, Atomic Energy Commission.*

Purposeful Endurance

"Still achieving, still pursuing, learn to labor and to wait."—LONGFELLOW.

FLOTROL Carrier Supply units



Model CS-1 with cover removed to show components.

FLOTROL CARRIER SUPPLY UNITS are designed to supply regulated 130 volt plate current for carrier or repeater operation. The units normally operate from 115 volt 60 cycle single phase power supply, and will automatically transfer to a built-in standby vibrator which operates from the exchange battery upon power interruptions, maintaining uninterrupted plate current during power failures. Regulated voltage is maintained during both normal and standby operation. CS units are housed in attractive light gray steel cabinets, and can be mounted on the wall or in a 19-inch relay rack.

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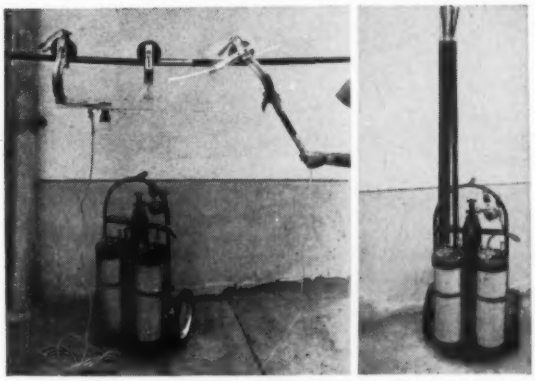

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Both models use highly successful chemical type leak detector. Applicator's dual nozzle sprays both sides of pressurized cable, giving 100% coverage. Bubble cluster forms around leak within minutes and can be clearly seen from the ground. Air pressure bottle in cart supplies regulated pressure in solution tank at all times, can be adjusted for different heights.

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Strowger Automatic is the only switching equipment in the world that has records even approaching 65 years of continuous performance in the field. During those years, the equipment has met every advance in telephony as easily as a scenery shift. Small wonder that so many telephone men choose Strowger! Visit a Strowger exchange and see for yourself. See the simplicity and flexibility of design that keeps Strowger in service after others are obsolete. Examine the craftsmanship and quality of construction. You'll know why Strowger has given 65 years of faithful service.

Your Automatic Electric representative is backed by 65 years of systems engineering and documented experience in all types of exchanges. Let him use his vast storehouse of knowledge to help solve your problems. Write: *Automatic Electric Sales Corporation, Northlake, Illinois. Or call FIllmore 5-7111.*

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GENERAL SYSTEM

In attendance at an Indiana District 4 luncheon meeting held at Franklin on Nov. 6 to honor C. E. McCormick, Terre Haute, newly elected president of General Telephone Co. of Upstate New York, Inc., were (left to right): Charles Jessup of Franklin; Clark Mull of Knightstown; Mr. McCormick; Francis Simpson of Winchester, and R. V. Achatz of Aurora. Mr. McCormick is a past president of the Indiana Telephone Association. Mr. Jessup was in charge of arrangements. Mr. Mull was re-elected president of District 4. Among other persons appearing on the program were Mr. Simpson, who is serving his second term as president of the Indiana Telephone Association, and Mr. Achatz, who spoke on the subject: "General Plant Problems."

C. G. Warnock to Direct IT&T News Service

The appointment of C. Gayle Warnock as director of news services for International Telephone & Telegraph Corp., effective Dec. 1, was announced Nov. 13 by Sydney Morrell, vice president—public relations.

Mr. Warnock, public relations manager for Ford Motor Co.'s Edsel Division, directed the two-year publicity campaign that preceded the marketing of the new line of Edsel automobiles. Previously he had been manager of Ford's midwest regional public relations office in Chicago.

In his new position, Mr. Morrell said, Mr. Warnock will head a staff responsible for the development and implementation of a program designed to keep news media informed of IT&T activities throughout the world.

Born in Converse, Ind., Mr. Warnock attended Indiana University before beginning his journalist career on the Marion (Ind.) *Leader-Tribune*, where he ultimately became managing editor.

Before entering the public relations field in 1945, Mr. Warnock worked on the Springfield (O.) *Sun*, the United Press in Indianapolis and the *Chicago Tribune*, where he served as a member of the political staff.

He was public relations manager of C. G. Conn, Ltd., band instrument manufacturers in Elkhart, Ind., before joining the Ford Motor Co.

Sense of Values

"The time has clearly come to be less concerned with the depth of the pile on the new broadloom rug or the height of the tail fin on the new car and to be more prepared to shed blood, sweat and tears if this country and the free world are to survive."—SENATOR BRIDGES.

THE AMERICAN ENTERPRISE SYSTEM

Continued from page 22

the telephone industry, and all utilities, in the over-all economic picture, remiss to you because these companies represent a full one-fifth of all manufacturing and service industries, therefore are a very important segment of our total economy.

Utilities are deemed "natural" monopolies. Therefore they are given franchises to operate exclusively in given areas, i.e., without direct competition. In return, they must submit their rates, their profits, their accounting systems, their depreciation charges and much else besides to governmental regulation by utility commissions.

We intend these commissions to perform the same functions for the regulated industries which competition performs for other industries.

This system generally has worked quite well. But with the 100 per cent inflation which started in 1940 there has been widespread failure to realize that utilities, like other industries, need price increases to cover higher wages and increasing costs.

Many of us have forgotten that competition, which is supposed to be the guide for utility regulation, has permitted other industries to adjust their prices and profits for inflation. We tend to forget, too, that we need the profit incentive for utilities, like all other industries, to get the best possible job done for the public.

Need for Adequate Return

For good profits in the public utilities, like profits in any industry, are in the public interest. They provide the earnings elbow-room which is necessary if utility managements are to be bold in planning improvements and expansion; if they are to be aggressive like other industrial leaders in innovating new services and operating methods; most importantly, if utilities are to be relentless like other industry in competing for the consumer's favor in order to increase their share of the total dollars he spends for all goods and services.

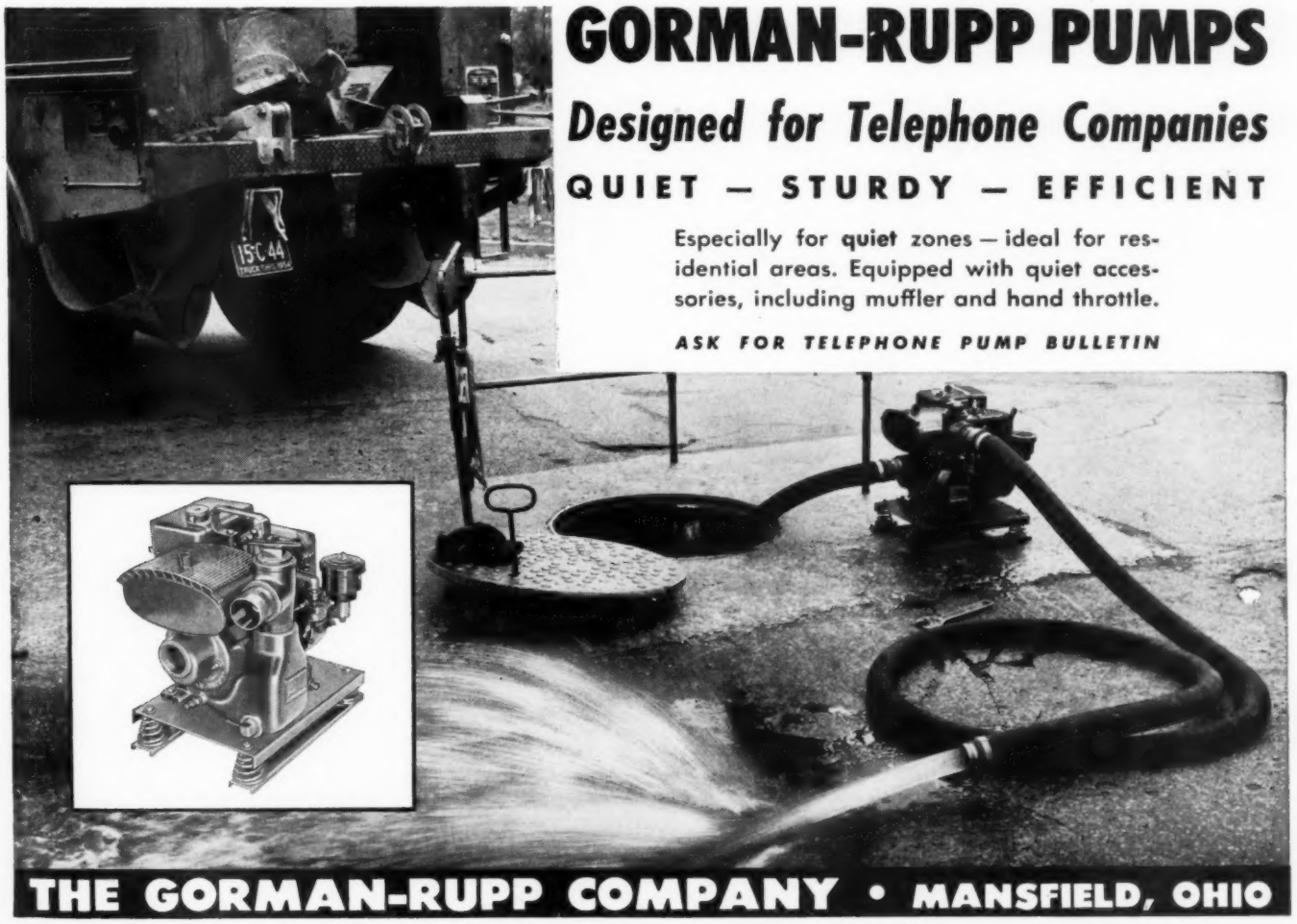
Viewed negatively, the lack of sufficient profits can cripple vital industries and impair services which are essential to the public and the nation at large. I know of no greater individual industry problem today than the railroads.

For a number of reasons, railroad earnings today generally are so low that some roads cannot raise the money they need for the improvement and expansion of their facilities. Only recently we witnessed the unhappy spectacle of the president of a leading railroad asking Congress to provide these funds by setting up a pool from which railroads might borrow to buy new rolling stock.

Yet the railroads are the backbone of the country's transportation system. Without them our economy would near collapse. Even with them, because of deferred maintenance, inadequate rolling stock and poor employe morale, we could be severely handicapped if another holocaust broke out like that we faced the morning of Dec. 7, 1941.

It seems to me that our experience with the railroads, to say nothing of the failures of our local private transit systems, sounds a noteworthy warning regarding the treatment which in the social interest ought to be accorded the other regulated industries which also furnish services so vital to the country's peacetime economy and its defense needs.

While talking about the needs for profits let me make one thing clear. My company and most companies are


GORMAN-RUPP PUMPS
Designed for Telephone Companies
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not looking for excessive, unreasonably high or extortionate profits. Business owners and managers seek many objectives besides profits. W. V. Kahler, president of Illinois Bell, listed five of these in a talk before Alpha Kappa Psi, commerce fraternity at the University of Illinois late last year. Here is his statement:

"What does motivate us as managers of a business?

"First, there's the personal satisfaction—the pride we get from accomplishing and achieving.

"The second thing that motivates business managers is the sense of loyalty to an enterprise.

"A third motivation in business is the desire for public approval of business conduct and recognition of what a business stands for. The desire—in fact the long range necessity—for public approval tends to check inclinations on the part of business to engage in socially undesirable activities, including excessive profits or disregard of the welfare of consumers and the community as a whole.

"A fourth motivation in business has developed increasingly in recent years—a sense of social responsibility and high standard of character and conduct. It is a sign of maturity that progressive business now thinks in terms of its obligations to consumers, to employes, to government and to the public as a whole. . . .

"Fifth—it is the hope of profit—because gain for the individual is, of course, dependent on business profits. This is basic in our free enterprise system."

Speaking before this group, made up of teachers who are concerned with the advancement of our cultural as well as our material welfare, one final word may be in order. Some of you may feel that my talk has been too materialistic, concerned solely with bread and butter—or perhaps with the prospects for more cake and better automobiles. You may feel that it disregards completely those spiritual, religious and cultural values which are so much more important to human well-being. If you have this reaction, let me defend myself and try to modify your thinking with two very brief quotations.

First, there is this statement by Theodore Houser: "As we have prospered and grown in an economic sense, we have grown also in the direction of achieving the goals the great religious and moral leaders have long envisaged for the great masses of people."

Second, these words of the Harvard philosopher, Raphael Demos: "Man cannot live by bread alone; nor can he live without it."

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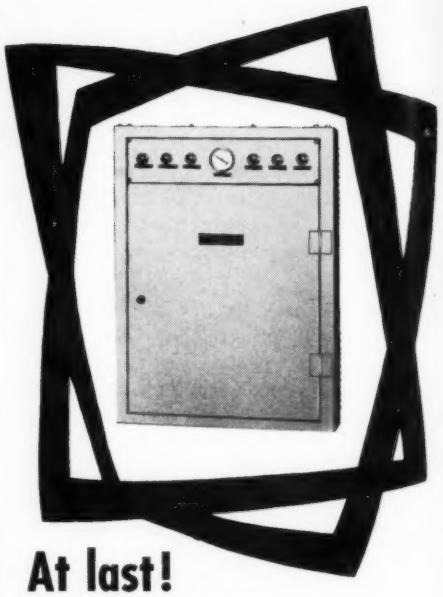

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DATA TRANSMISSION

Concluded from page 29

timed to operate at the frequency of syllables in speech. The effect is to reduce the effect of the noise that is picked up on the line by reducing the noise between syllables.

While this sounds fine to a human listener, it means less than nothing to a computer; in fact the compandor may have to be disconnected before a carrier can be used for data transmission.

Echoes

Another gadget which is used widely on long lines is the echo suppressor. This is in effect a voice operated relay which shorts out transmission in one direction while speech is being transmitted in the other direction. This can have a great pacifying effect in a quarrel where both people talk at once and neither can hear, but, again, it is of no help on a data circuit.

There are a number of ways in which data can be sent over telephone lines, and new ideas are being developed constantly. Accompanying this article is a table of systems which were in use in March, 1957. This is just to give you an idea of the different requirements; it is not pretended that the list is up to date.

Many schemes have been devised to detect errors in transmission on data systems. Some systems may require a certain number of transmissions for each item of data, some may use odd or even numbers of bits, some may use start and stop signals which must be used with every piece of information sent, some may use a composite signal of different amplitudes to signify beginning or end of an item.

In each of these cases, the receiving mechanisms are designed to identify these check signals, and if an incomplete or incorrect piece of information is received, the machine will block. Some machines may automatically cause the sender to repeat the last message; some will stop and ring an alarm; some may automatically send everything twice to reduce error.

Drawback

With any of these systems, the compandor or echo-suppressor may be a drawback. The compandor may change relative volume levels when volume level is important; echo suppressors may chop off a stop or start signal which a receiver is trying to send to a transmitter.

In addition, a narrow bandwidth may greatly attenuate parts of the message in systems which use different frequencies. Thus, a circuit which may be adequate for speech may be a dismal failure on a data circuit, and the usual devices for improving the speech qualities may be utterly useless to correct the trouble.

(Next: The IBM data transmission system)

DESIGN OF SMALL COMPANIES

Concluded from page 38

that it be printed on light cardboard with suitable glazing to permit erasures as it will extend its serviceable life for a considerable period. An individual card should be prepared for each customer with his name and address entered in space A, the new dial number, after it has been set up (discussed later) in space B, and the old switchboard number in space C. The present type of service should be indicated in space D. The additional spaces shown on the card will be discussed in a later article.

The customer information for these cards should be secured from billing records and cross-checked with any switchboard, commercial or plant records, in order that all existing subscribers are listed. The completion of this phase gives a basis to prepare the actual cut-over sheets which will show the new line groupings, regrades, and all other subscribers who are retaining the same type of service.

Fig. 4 is a suggested cut-over sheet on which is illustrated a new regrouped rural line, a residence two-party line, a regrade, a new residence subscriber, and a business single line. In actual practice the sheets should be divided into rural and urban classifications, since it will simplify the assignment of the new dial numbers. The cut-over sheets should be accurately checked with each customer card to be certain that they include all subscribers.

This data will make it possible to actually count the number of lines needed to accommodate the existing customers and the anticipated additional line requirements for regrades and new business at the time of the cut-over.

This information, and that discussed in Part 1 of this series, will determine the ultimate size of the board along with the number of lines installed when it is cut into service. It will also sup-

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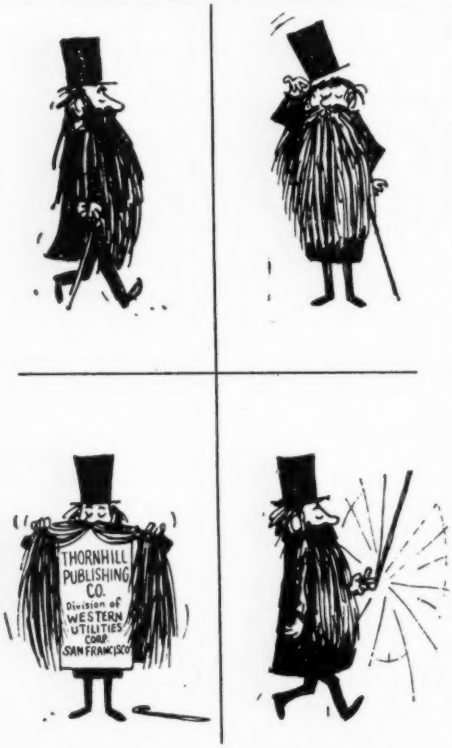

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ply the exchange line fill, which data will be required by the manufacturer in order to determine the required number of selectors and connectors to properly handle the traffic load.

Additional problems will be encountered in the purchase of a new automatic switchboard, but the solution of them is a responsibility which is willingly accepted by the manufacturer because of his desire to supply equipment which will give continuous dependable telephone service.

(To Be Continued)

Ansonia Appoints Novak Assistant to President

Alden P. Lunt, president of The Ansonia Wire & Cable Co. has announced the appointment of Albert J. W. Novak as assistant to the president for sales and marketing.

A. J. W. NOVAK

Mr. Novak, who joins the company from Brush Electronics Co. division of Clevite Corp., with whom he was successively sales manager and then vice president and general manager of their Texas division, Houston plant, will be directly responsible to the president for the company's sales and marketing program.

Mr. Novak assumed his responsibilities on Nov. 1, 1957 and is located at the home office of the company in Ashton, R. I.

The Tax Bite

". . . in 1956, a year in which the labor leaders and politicians were talking loudly of our unprecedented employment and prosperity, manufacturing profits (after taxes) sank to the level of recession years. From 4.9 per cent in 1948 these net profits fluttered steadily downward to 3.1 in 1956."—*Ozona (Tex.)* STOCKMAN.

To Direct Division and Field Relations for IT&T

Arthur C. McCarroll Jr. has joined the public relations department of International Telephone & Telegraph Corp., as director of its division and field relations, it was announced Nov. 8 by Sydney Morrell, vice president. He will be responsible for developing and coordinating public relations activities of IT&T units in this country.

Mr. McCarroll goes to IT&T from the Chrysler Corp., where he served for five years first as West Coast public relations director, then as head of the company's information services in Detroit.

Born in Pittsburgh, Pa., he studied both at Carnegie Institute of Technology and Pennsylvania State College. He was a reporter on the McKeesport (Pa.) *Daily News* and the Pittsburgh *Sun-Telegraph*, and a member of the publicity and public relations department of Westinghouse Electric Co., before joining the Marine Corps during World War II, during which he served as a radio technician and combat correspondent.

From 1946 to 1947, he was assistant public relations director of the Rexall Drug Co. in Los Angeles, Cal., and from 1947 to 1952 held various positions with the Los Angeles *Herald-Express*, including that of assistant city editor.

Draw Your Own Conclusions

"It is generally agreed that the average driver reacts in three quarters of a second. At 60 miles per hour, a car will travel 66 feet in that time. At 40 miles per hour it will travel 44 feet, at 20 mph it will travel 22 feet."—*Texhoma (Okla.) Times.*

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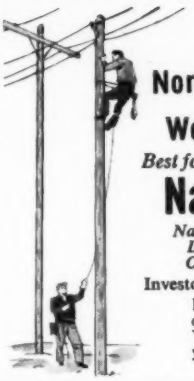

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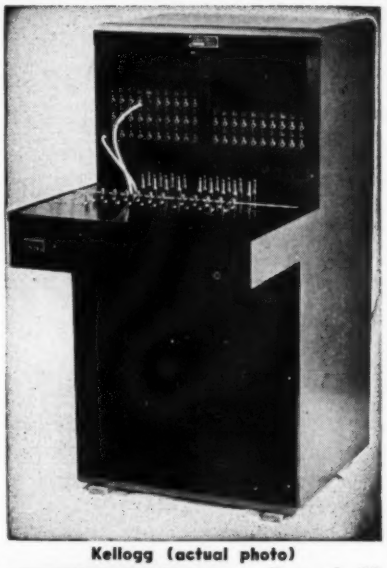
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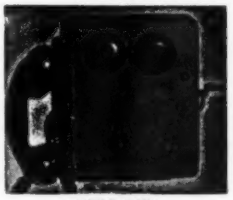
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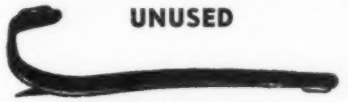
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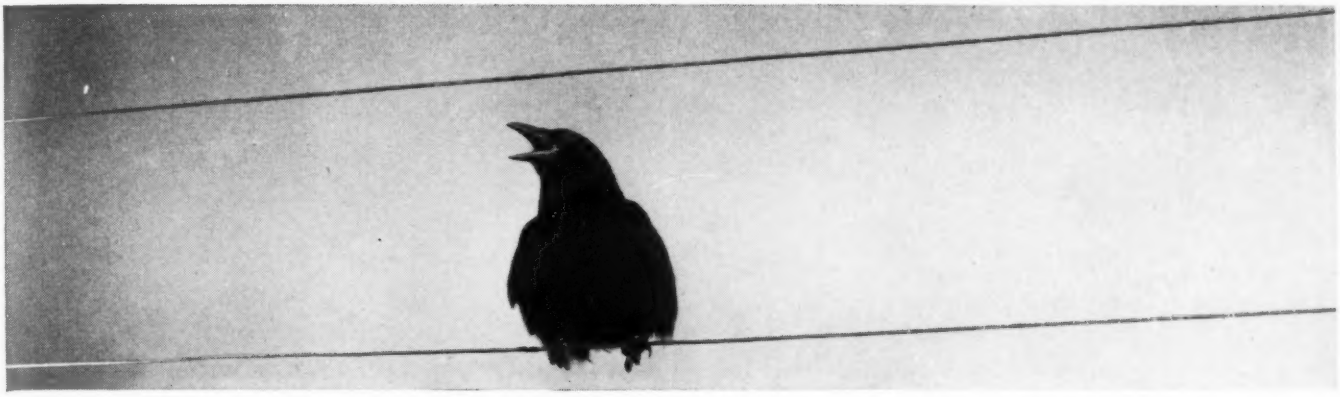

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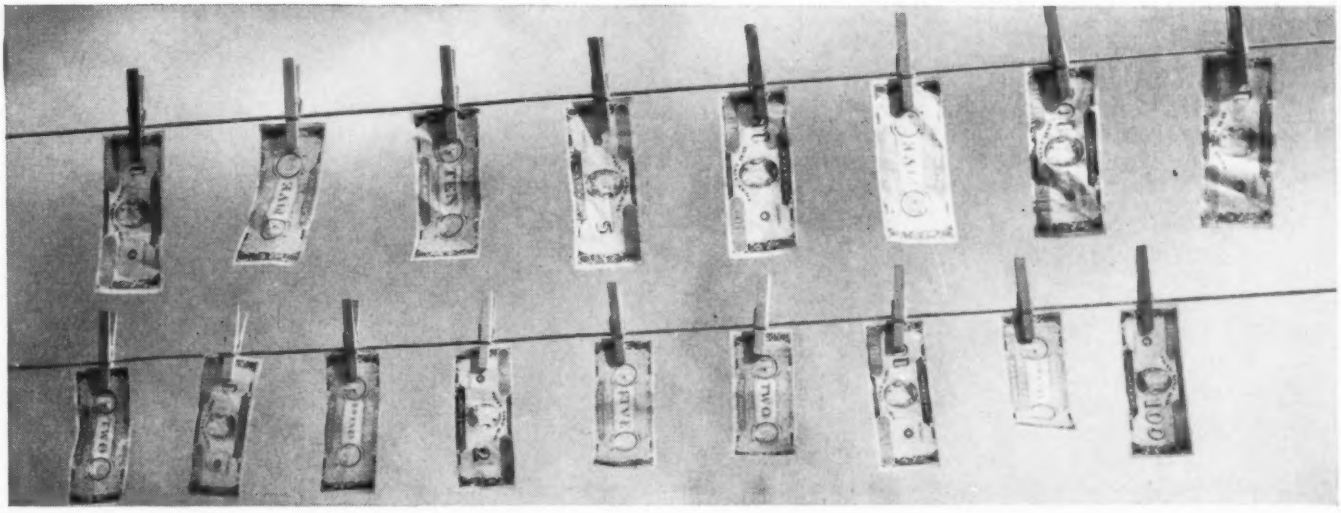

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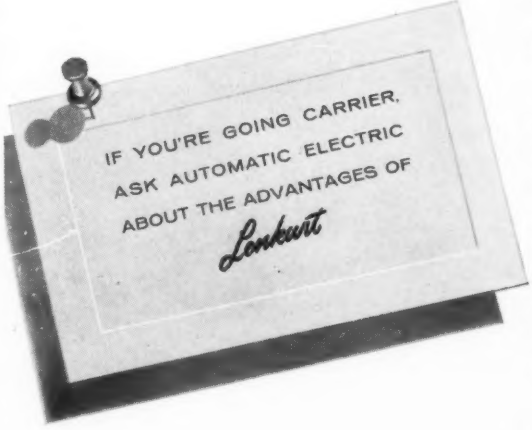

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